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ELEMENTS OF PSYCHOLOGY

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ELEMENTS OF PSYCHOLOGY

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PREFACE.

THIS book is intended, in the first place, as a contribution to the *teaching* of Psychology,—a subject which always presents peculiar difficulties to the beginner. Our endeavour has been to provide a text-book in which the needs and difficulties of the beginner receive primary consideration.

We have throughout accepted growth or development as the fundamental characteristic of the mind; and this growth we view as essentially a process of action and reaction between the mind and its environment. By its own self-activity the mind in a very literal sense creates its own world; and for this reason, no less than for purposes of exposition, we have placed the treatment of activity earlier than is customary. The student who has not an inborn analytical faculty always finds the psychology of sensation and perception the hardest part of the subject; for in common life he scarcely ever puts himself in the psychological attitude with regard to them. Meeting thus with peculiar difficulties at the outset, he is often permanently discouraged. His activities and feelings, on the other hand, he does frequently examine, and is more prepared to understand the psychological difficulties to which they give rise.

At the same time, the order of our chapters may be varied; and whatever order is adopted the fundamental difficulty of all psychological exposition still remains—viz., the *interaction* of psychical phenomena. We have to deal separately with processes which in reality are always varying concomitantly and mutually affecting one another.

We have taken pains to encourage the student who uses this book to do some genuinely psychological thinking for himself, and to make him dissatisfied with lifeless and superficial ideas, such as those which unfortunately still abound in the work of Examination-candidates in this subject.

Consideration has been given also to the needs of the student who is not merely a beginner. We have had in view the treatment of the subject usually required by the course of instruction for the Ordinary Degree in British Universities and Colleges. The book stops short of giving what is supplied in such a work as Professor Stout's *Analytic Psychology;* but it is intended to show the "open door," and lead on naturally to a serious study of one or other of the main branches of modern psychology. The books referred to for further study have been selected as those most suitable and most accessible to English readers, and as themselves supplying reliable references to authoritative foreign works.

Our view of psychic life has compelled us to regard the questions we have raised mainly from the genetic point of view; hence we trust that the student of Education will find that, although we have been prevented by considerations of space from drawing in any detail the practical deductions with which any vital treatment of the subject of psychology must abound, yet we have set forth the material in such a way as to aid him in applying his knowledge of the laws of mind to the practice of his own art.

In the employment of physiological illustrations we have definitely adopted the hierarchical conception of the nervous centres which is implied in the best recent work in Neurology and Psychiatry. The distinction and relation of cortical centres of different levels is a conception fruitful in psychological suggestiveness. For assistance in matters of physiological detail we are personally indebted to Dr W. B. Drummond, Medical Officer and Lecturer on Hygiene to the Edinburgh Provincial Committee for the Training of Teachers, who is also largely responsible for the physiological glossary; and to Dr W. Ford Robertson, Pathologist to the Scottish Asylums, who kindly allowed us to see in MS. part of his forthcoming translation of an authoritative work on Psychiatry by E. Tanzi.

Both the authors wish to acknowledge indebtedness to the personal instruction of Professor A. Seth Pringle-Pattison, of Edinburgh University; and one of them also to that of Mr (now Professor) James Ward, and to personal converse with Mr (now Professor) G. F.

Stout at Cambridge. We wish also to express our thanks to the Rev. Professor A. Caldecott, D.D., of King's College, London, and to Miss C. S. J. Cameron, L.L.A., of Edinburgh, who have read part of the manuscript. Our obligations to the psychological literature of to-day are doubtless extensive; but we must make special mention of the writings of Bain, Stout, Ward, James, Sully, and Ribot. We hope, none the less, that some freshness of treatment will be found throughout the following pages, and that a few of the perennial problems of the subject will appear focussed in a clearer light. We have treated psychology as a living science, —"living," because full of problems as yet unsolved; and where such problems occur, our aim has been to indicate the fact, not to conceal it or to lay down dogmatic solutions which are mere unverified opinions.

SYDNEY HERBERT MELLONE.
MARGARET DRUMMOND.

CONTENTS.

CHAPTER I

MEANING AND METHOD OF PSYCHOLOGY.

SECTION PAGE

1. The psychological attitude 1
2. "Mind" and "consciousness" as fundamental terms . 5
3. Stages in scientific method 7
4. Observation in psychology 8
5. Difficulties in psychological self-observation . . 13
   Comte, Mill, and Lewes on Introspection . . 18
   References 17, 18

CHAPTER II.

DIFFERENT BRANCHES OF PSYCHOLOGY.

1. Analytic Psychology 20
2. Individual Psychology 21
3. Abnormal Psychology 22
4. Genetic Psychology 23
5. Child Psychology, Comparative Psychology, Race Psychology 25
6. Physiological and Experimental Psychology . . 28
   Value of physiological illustrations . . . 32
   References 21, 25, 31, 33

CHAPTER III.

THE MOST GENERAL CHARACTERISTICS OF MENTAL LIFE.

1. Continuity of consciousness 34
2. The psychological "Law of Relativity" . . 37
3. "Focus" and "margin" of consciousness . . 40
4. Subconscious processes 41
5. Unconscious processes 44
References 36, 39, 48

CHAPTER IV.

GENERAL CHARACTERISTICS OF MENTAL LIFE, CONTINUED: ACTIVITY, FEELING, THOUGHT.

1. Learning by experience 50
2. Three inseparable factors of mental life . . . 55
3. Activity or conation 60
Experience of activity 64
4. Feeling 65
Pleasure and pain 67
5. Knowing 69
Position of sensations 70
6. Different "levels" of mental development . . 71
References 58, 64

CHAPTER V.

MIND AND BRAIN.

1. The scientific conception of "matter" and "energy" . 74
2. Application of these principles to the brain . . 77
3. Localisation of brain-function: examples . . 78
4. Where does consciousness come in? . . . 83
5. Consciousness the fundamental reality . . . 87
6. Possibility of reconciliation 89
7. Only two alternatives possible 93
8. The theory of parallelism 94
9. The theory of interaction 96
References 97

CHAPTER VI.

MENTAL ACTIVITY.

1. Voluntary and ideo-motor action . . . 99
2. Voluntary action as deliberate choice . . . 104
3. What is the "strongest" motive? . . . 108
4. Feeling of effort 111
Effects of emotion 117
5. Action against the will 118
6. Habit 122
7. Interest 126
8. Attention 130
Span of attention 132
Varieties of attention 133
9. Desire 137
Need 140
Impulse 141
References . . . 111, 120, 125, 130, 137, 141

CHAPTER VII.

THE ORIGIN AND GROWTH OF MENTAL ACTIVITY IN THE INDIVIDUAL.

1. Pre-volitional movements: (*a*) random and reflex . 142
2. Motor sensations 146
3. Pre-volitional movements: (*b*) instinctive . . 150
Human instincts 152
4. Instincts as transitory and as indeterminate . . 155
5. Process of learning 158
6. Growth of interest 162
7. Growth of attention 165
8. Beginnings of definite volitions 168
9. Complex volition 170
10. Conation as fundamental 175
References 149, 157, 182, 185

CHAPTER VIII.

SENSE-FEELINGS.

1. Organic sensations 186
2. Varieties of organic sensation 189
3. Other characteristics of organic sensations . . 195
Pain-sensations 197
4. Feelings aroused by special sensations . . . 201
5. Conditions of the affective quality of sensation . . 204
References 195, 197, 207

CHAPTER IX.

THE EMOTIONS.

1. Psychological qualities of the emotions . . . 210
2. Structure of emotion; resulting problems . . 212
3. Emotion and sentiment 216
4. Emotion and habit 218
5. Emotion and its expression 221
6. Development of emotion 226
7. Memory of pleasures and pains 232
8. Classification 235
9. Fear, anger 236
10. Love 242
11. Sympathy 245
12. Sympathy and reverence as fundamental moral impulses . 250
13. The moral sentiment 251
References . 226, 236, 241, 243, 246, 253, 254, 256

CHAPTER X.

THE GENERAL CONDITIONS OF PLEASURE AND PAIN.

1. Meaning of problem 257
2. Pleasure, pain, and activity 258
3. Pleasure, pain, and desire 263
4. Feeling-tone of intellectual activities . . . 264

5. Feeling-tone of the æsthetic consciousness . . 270
Conditions of æsthetic feeling 273
6. Biological and psycho-physical theories . . . 276
References 270, 275, 278

CHAPTER XI.

THE SPECIAL SENSES.

1. Essential aspects of sensation 280
2. Sense of taste 282
3. Sense of smell 285
4. Sense of touch (cutaneous) 286
5. Sense of temperature (cutaneous) . . . 289
6. Sense of hearing 290
Description of the ear 291
Sensations of sound 293
7. Sense of sight 295
(i) Organ of vision 296
(ii) The retinal "image" 299
(iii) Binocular vision; the stereoscope . . 300
(iv) Colour-sensations; physiological problem . 302
(v) Intensity and saturation 304
(vi) Duration 305
8. Psycho-physical problems connected with sensation . 306
(i) Minimum of sensibility 307
(ii) Range of sensibility 307
(iii) Least noticeable differences . . . 307
Methods of investigation 308
Weber's Law 310
(iv) Reaction-time 311
9. Are our sensations reducible? 312
References . 284, 286, 289, 290, 295, 304, 306, 314

CHAPTER XII.

THE PERCEPTION OF OBJECTS.

1. Attention as selective 315
2. Factors in mental elaboration: Discernment . . 317

3. Recognition 322
4. Discrimination and integration 324
5. Primary and secondary qualities 329
6. Perception of external reality 330
7. Perception of the body 332
8. Perception of "things" or "objects" . . . 334
9. Space-perception : not given by movement only . . 337
10. Extensity and local signs 341
11. Co-operation of the three factors : (1) in touch . . 344
12. Co-operation of the three factors : (2) in sight . . 346
13. Co-operation of sight and touch 350
14. Perception of time 352
References 327, 336, 337, 353

CHAPTER XIII.

MEMORY.

1. Factors in memory : retention 356
2. Conditions of retention 360
3. Experimental work 363
4. Reproduction : laws of association . . . 366
5. Effects of emotion and interest 370
6. Types of memory 373
7. Contrast of percept and memory-image . . . 376
8. Memory of the emotions 377
9. Simple recognition 381
10. Localisation in time 383
11. Diseases of memory 387
References 364, 390

CHAPTER XIV.

IMAGINATION.

1. Imagination and memory ; forms of imagination . 392
2. Types of imagination 397
3. Images on the field of darkness 405
4. Hallucinations and illusions 410

5. Theories regarding the physiological accompaniments of imagination and memory 412
6. Limitations and dangers of the imagination . . 416
7. The work of imagination in building up the world of reality 419
References 416, 422

CHAPTER XV.

COMPARISON AND CONCEPTION.

1. Comparison and conception 424
2. Nominalism and conceptualism 426
3. Part played by language 431
References 435

CHAPTER XVI

THE SELF.

1. Personal identity 440
2. Meaning of the term self 443
3. Development of the self 449
4. Diseases of personality 457
5. Relation of consciousness to the self; continuity of the self in time 464
References 468

PHYSIOLOGICAL TERMS 471
INDEX 473

NOTE.

PASSAGES in small print may be omitted by those who are reading the subject for the first time.

It will be seen that certain references to passages from other books are marked with an asterisk: this mark is for the guidance only of those who are working at the subject without the aid of a teacher, and it signifies that such passages will form a convenient starting-point from which the student may extend his reading.

The student is reminded that the index is intended to be used. When reading a particular topic, he should consult the index in order to compare incidental references which have been made to it in other parts of the book.

ELEMENTS OF PSYCHOLOGY.

CHAPTER I.

MEANING AND METHOD OF PSYCHOLOGY.

§ 1. *The psychological attitude.*—The attitude of mind which we have to adopt in psychological study usually seems to the beginner an unnatural and elusive one. The difficulty arises, however, not simply from adopting the attitude but from having to adopt it so thoroughly and extensively. The reader is no doubt familiar with Molière's representation of the *bourgeois* who found that he had been talking "prose" all his life without knowing it. By the help of an appeal to modes of expression which are in common use in our language, we may give examples of the adoption, or partial adoption, of the psychological attitude by people who may never have heard of psychology as a science.

(*a*) Consider the following expressions: "I am attending to what you say"; "I want to know whether it is so or not"; "I doubt it"; "I hope so"; "I fear he has failed"; "That is what I desire"; "I remember seeing it last year"; "I am very interested in it"; "I see a cloud of dust"; "I believe it"; "I know it to be so as a matter of fact." Each of these expressions implies (1) a certain process, and (2) something to which the process refers or relates. In the cases mentioned, the various processes are attending, questioning, doubting, hoping, fearing, desiring, remembering, being interested, perceiving, believing, knowing. All such processes as these are called *mental*, as having their source in or forming part of the life of the *mind*. But in addition, these expressions imply *something which is* attended to, doubted, feared, &c. In each case this something is called the *object* of the process. There is no difficulty in seeing the distinction between a mental process and its object,—between the process of attending and the thing that is attended to, between the process of desiring and the thing that is desired, and so on. In some cases the distinction is peculiarly obvious. We are in a questioning attitude of mind about the length of a room: but the room, the object, is not in a questioning state; it is *we* who are in doubt *about* it. The mental condition of questioning has characteristics of its own apart from those of its object. The distinction is equally obvious in the case of "desiring," "voluntarily choosing," &c., and indeed in most of the cases mentioned above; and though not always so obvious, it holds throughout.

This distinction being grasped, we must next point out that any one making use of such expressions as those quoted, would imply that he is interested to a certain extent *in the process* as well as in its object; for such statements would only be made when the person wished to make reference not only to the thing which he attends to (or doubts, fears, &c.), but also to the fact that *he is* attending to it (doubting it, fearing it, &c.) Such modes of statement seem to emphasise this latter fact, thus indicating that for the moment there is an interest in the process on its own account, so to speak, and more interest in the process than in its object. Now, when you begin to be interested in the mental process on its own account or for its own sake, you begin to be in the attitude which the psychologist takes up in the study of mental facts.

(*b*) Consider, next, such questions as the following: "Are you *sure?*" "Why did you do that?" "Did you do it on impulse or after thinking about it?" "What were you dreaming last night?" "Tell me how you reasoned this out." "Do you feel better?" "How many times did you have to repeat this list of dates before you knew it perfectly?" "Why does this remind you of something unpleasant?" Here there is distinctly stronger interest in the mental process on its own account, and comparatively weak interest in the object. In order to give any real answers to such questions, we should have to be more fully in the psychological attitude. We are so whenever we are interested in our thoughts, purposes, or feelings for their own sakes rather than in the object thought, purposed, or felt.

(*c*) Not yet, however, are we in the psychological attitude in the stricter scientific sense of the word "psychological." For in all such cases as those that we have mentioned, where the reference is understood to be to a particular person in particular circumstances, the mental processes referred to may be complicated with mere personal peculiarities. As a matter of fact, the particular forms which a person's mental processes take are dependent on countless characteristics which are probably peculiar to him. But when we are able to penetrate through these special characteristics to something in the mental process, which is true of all minds, we have arrived at the kind of psychological fact with which science is concerned. For example: a certain appearance in the sky suggests to me coming rain. In common life I should probably be interested mainly in the possible rain rather than in the process of its suggestion to my mind; the latter is, however, a psychological fact. But if I cannot get any farther with it, it is of no scientific interest. Why does the appearance suggest coming rain? Because in the past I have noticed rain to follow when the sky looked *more or less like* this. This experience signifies that when the union of two events has been to me an object of interest in the past, the repetition—however partial—of one of them may arouse the idea of the other. This result is no peculiarity of mine; it is true of all healthy minds,—in other words, it is a *general truth;* and it is with such truths that science deals.

In common life we are mostly content if we know enough for practical purposes. But even this workaday knowledge of mental processes is not merely personal. The natural association of individuals in the family and in civic life compels a reflection—though it is scarcely conscious—which results in a knowledge of mind, confused and superficial, but containing the germs of scientific knowledge. Psychology starts with this everyday working acquaintance which we have with our own minds, and develops and extends it, in order to arrive at a general understanding of the mind, on the basis of characteristics which are not personal peculiarities but are shared by all minds.

Our results so far may be summed up in the following statements:—

(1) Psychology is a reasoned scientific account of the processes of which our mental life consists.

(2) Psychology is interested in these processes on their own account, whatever their objects may be.

(3) While psychology cannot utterly disregard the objects, it is interested in them only so far as they throw light on the processes.

And since mental processes do not float about in the air by themselves, we must add:

(4) Mental processes always form part of some individual mind, in the most intimate connection (1) with a particular living body, (2) with a particular community or society; and it is impossible for psychologists to disregard either of these connections. Some of their most important consequences will be discussed in the sequel.

Adequately to deal with the question of the "standpoint" of psychology—that is, to define precisely the subject-matter with which the science deals—would carry us beyond the limits of psychology, and raise questions belonging to Epistemology or the Philosophical Theory of Knowledge. See Ward, "The Definition of Psychology," in *The British Journal of Psychology*, vol. i., No. 1. Psychology is on an entirely different level from the other sciences, for there is no object of human investigation, there is nothing that can be thought, known, done, or felt, which has not its psychological aspect.

§ 2. "*Mind*" *and* "*consciousness*" *as fundamental terms.*—The fundamental term "mind" (or "mental," to which "psychical" is equivalent) is not definable in the ordinary sense of the latter word;[1] only when we know everything there is to know about the mind can we "define" it. The term "consciousness" is almost equally fundamental, for it covers a great part of what we denote by "mind"; and it is "indefinable" in the same way. We can only refer to our own experience and give examples of it. "Whatever we are when we are awake, as contrasted with what we are when we fall into a profound and dreamless sleep, that it is to be conscious; what we are less and less, as we sink gradually down into a dreamless sleep, or as we swoon slowly away; what we are more and more, as the noise of the crowd outside tardily arouses us from our after-dinner nap, or as we come out of the midnight of the typhoid-fever crisis,—that it is to be conscious."[1]

---

[1] See *Introductory Text-Book of Logic* (Mellone), 2nd ed., p. 133.

Very misleading metaphors have been used with regard to mental processes. Thus John Locke, one of the founders of the British School of Psychology, in his *Essay Concerning Human Understanding* (1690), speaks of mental life as "the scene of ideas"; by "idea" he usually means what we mean by "mental process," but he started the custom of speaking as if "ideas" were in some way like separate things that could move about in the mind and act and react on one another. The reader must carefully bear in mind that there is no ground for any such assumption. Many writers have spoken of the subject-matter of psychology as being "states" of mind or of consciousness. All the associations of this word are misleading. To talk about "states" of mind as a scientific term, not as a mere literary expression (as we may sometimes use it), inevitably implies — to put it roughly—that the mind may be compared to a kind of fluid that is capable of being put into various shapes—*i.e.*, that the mind is something passive or inert, and has various "states" belonging to it. The natural result of such a view of the mind is found in the writings of David Hume in his *Treatise of Human Nature* (1739), and of John Stuart Mill in his *Examination of Sir W. Hamilton's Philosophy* (1865), who defend the paradox that the mind is nothing but a series of these "states of consciousness."

---

[1] Ladd, *Psychology, Descriptive and Explanatory*, p. 30.

§ 3. *Stages in scientific method.*—Our next question is, What are the characteristics of the "reasoned scientific" knowledge at which psychology aims? This is the question of the method of psychology.

We may say that there are three steps in the process by which any Science seeks to realise knowledge. The first step is to get a hold on the facts: this is called Observation or Description. In the case of a complex mental process—that is, one in which various features or elements can be discerned—"Description" means to distinguish these, and to find as far as possible the simplest elements composing the process. This is psychological "analysis." Sometimes the constituent elements of a complex fact are found to be capable of existing separately (as in the case of a highly developed process, such as reasoning). More usually the elements are such as cannot exist separately in actual experience.[1] Where no simpler constituent elements can be discerned in a mental process, we must (as far as possible) "point out" the process, as we have done in the case of "consciousness" itself.

The second step is to ascertain *laws*,—that is, to assign those processes which must be present, or must have preceded, in order that the given process may occur. These are called its "conditions." Psychology has been able to discover such processes in the tangle of our mental states, which have been compared to the changing patterns in a kaleidoscope. The conditions of a mental process consist partly of other mental processes, partly of processes in the brain and nervous system.

---

[1] The point of this observation will appear more fully in the sequel—viz., that such a process could never be "explained" as having been formed "out of" the parts composing it, inasmuch as they never existed separately.

The third step is called Explanation,—that is, to connect the various processes and laws together into a whole. Different and conflicting methods of doing this have been proposed at various times in the history of psychology, and much controversy has in consequence arisen. We may, however, give to "explanation" a less ambitious aim, and make it signify what is really attainable: to show how a particular fact is really a case of a more general principle or principles; or when we can discern, in a complex mental activity, elements which *experience shows* to be capable of existing separately, to ascertain the laws according to which they have been combined to form that more complex state.

§ 4. *Observation in psychology.*—Observation, even in physical science, is by no means the merely mechanical affair that it is sometimes represented as being. When we observe the world around us, objects are not given to the mind as if they were reflected in a mirror.[1] We observe what we are interested in, or what is connected with things that we are interested in; we must know something already about the objects we are to observe; and the better our intellect is already stored with knowledge relating to those objects, the better observers we make. The same is true of observations of our own minds. The two kinds of process are much more alike than has been supposed. One of the greatest needs of psychology at the present day is a better theory of observation, and a truer view of the precise resemblances and differences between the observation of one's own mind and of the outer world. The most obvious difference is in familiarity and frequency of occurrence. Most of our waking life is taken up with observation of the outer world, including other persons, and only a small part of it, for a few moments at a time, with observations of our own minds. Yet, but for self-observation we should never know that we had a mind. Every one directly experiences his own mental processes, and no one can do it for him.

---

[1] *Introductory Text-Book of Logic*, pp. 291, 292.

On the other hand, he cannot directly experience any mental processes except his own. Thoughts may be communicated by words or signs to another person, and that other may reproduce their meaning in his own mind; but no one else can ever know the thoughts as they are for the one who thinks them. Each man in the same way feels his own feeling and only his own feeling. In this sense, "our hermit spirits range apart."

> "Yes! In the sea of life enisled,
>   With echoing straits between us thrown,
> Dotting the shoreless watery wild,
>   We mortal millions live alone.
> The islands feel the enclasping flow,
> And then their endless bounds they know."
>
> —MATTHEW ARNOLD, "Isolation."

In illustration of what has been said, take the case of sight. A nerve can be traced from the eye to the brain. Some "molecular disturbance," some series of changes, passes along the nerve to the brain, and some process takes place in the nerve-cells there; but these facts are not what we mean by sight as a mental or conscious process. The molecular changes are localised in the brain; the conscious process is not localised. It follows that a physiologist might have complete knowledge of everything that takes place in the brain, but would not have the faintest suspicion of a conscious fact, unless he had experienced such facts in his own life. A man who was absolutely deaf and had never heard a sound in his life, might have the most accurate knowledge of all that takes place in the auditory nerves and brain, and yet would not have the remotest idea of what a sound was like. After such discoveries as that of the Röntgen Rays, it is not inconceivable that at some future time we may be able to follow every change that occurs in the brain, *e.g.*, of a sleeping man. Such changes would correspond to the course of his dreams; but they would indicate nothing as to what the dreams were, and indeed nothing that we could observe in his brain would suggest any conscious process at all, had we not other reasons for supposing that such processes were going on along with the brain changes.

The term "self-observation" is not in general use: instead of it we find the terms "self-consciousness," "reflection," "introspection." Self-consciousness, in popular usage, signifies the mental perturbation which results from excessive attention to one's person or performances. This meaning we set aside. Following the terminology suggested in Baldwin's *Dictionary of Philosophy and Psychology* (vol. ii. p. 435b, 436a), we use self-consciousness to signify all or any of the knowledge which a person has of his own mind or of himself[1]—slight or extensive, superficial or profound; and, for the purposes of psychology, we distinguish three stages of self-consciousness. (1) Self-consciousness as implying merely that I happen to be aware of my own mental state, as in the illustrations given in § 1*a*. "When I fail to hit a mark with a missile, I become aware of myself as disappointed, and to that extent am self-conscious. But I may not stay to think about my mental state. The main current of interest may still be directed to the mark and the means of hitting; I may at once take up another stone and take aim again. In this case I do not reflect upon my disappointment; I am merely aware of myself in an incidental way."[1] (2) Self-consciousness as "reflection," implying a more special interest in the process on its own account, as in the illustrations given in § 1*b*. (3) Self-consciousness as "introspection," which implies a still more sustained interest in the mind and its processes, in order to gain general and systematic knowledge of mental operations, as in § 1*c*. Scientific observation in psychology is usually called "introspection."

---

[1] In this connection the words "mind" and "self" may be regarded as equivalent—*i.e.*, "knowledge of one's mind" = "knowledge of oneself."

We must distinguish the popular use of the term "reflection," as signifying to think about any object of any kind, from its psychological use. The psychological use of the word implies a metaphor,—the "bending back" of the mind upon itself. At first our natural attitude is that of observing objects in the outer world; it is only at a later period that the mind observes its own contents.

We have said that the two processes, of observing one's own mind and observing the outer world, are much more alike than has been supposed. But the tendency of the older psychologists was to exaggerate the resemblance. Thus Locke seemed to suppose that we have a hold on the processes of our mind by an "inner sense," just as we have on the material world by our "outer senses." This resemblance does not exist. The "outer senses" are definite organs, eye, ear, &c., for the reception of definite kinds of stimulus. There is nothing remotely resembling this in the case of the mind. I hear a musical note: this means that a stimulus of a certain kind has acted on the brain by means of the ear and auditory nerve, and along with, but distinct from, the cerebral process thus induced, there goes a mental process called (in this case) a sensation of sound. But when I introspectively examine this sensation, to see for instance whether I can discern any separate tones in it, there is nothing like the stimulus of a new sense-organ.

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[1] Baldwin, *loc. cit.*

We have said also that a person has immediate access only to the processes making up his own consciousness, or, as Locke puts it, "The scene of ideas making up one man's thoughts cannot be laid open to the immediate view of another." He knows the other's thoughts only by signs,—language, expression, and so forth. This does not mean, however, that introspection has to be carried on in absolute solitude. Hamilton said that "he who would study the internal world must isolate himself in the solitude of his own thought." Taken literally, this would mean that a hermit is the best psychologist. Communication and interchange of ideas is as possible and as necessary in psychology as in any other science. It is possible and necessary, because self-knowledge and knowledge of others grow side by side in the closest relation to each other. We can only understand the mental processes of others (expressed to us through words, actions, and other signs) so far as we understand our own; and on the other hand, as Professor G. F. Stout observes, "it is mainly in the attempt to find out what goes on in other minds that we are led to notice what goes on in our own."[1] And the interpretation of other minds constitutes a valuable test of the results of our own psychological observation. Human minds all act, within certain limits, according to the same laws, or are the same in general characteristics. If our neighbour gives an account of what passes in his own mind we can compare it with our own experience, and if it tallies, it is an important verification. At the same time, if we interrogate our neighbour we may bring to light minor differences, since the general sameness of minds does not extend to details, which may be only peculiarities of mental action. Thus, in the case of imagination (*e.g.*, summoning up a scene in memory, or when described) we find that the process varies much in different people: some vividly image the picture from the description, others scarcely "see" it at all.

> "My father!—Methinks I see my father."
> "Where, my lord?"
> "In my mind's eye, Horatio."
> —*Hamlet*, Act I. sc. ii.

Autobiographies or Confessions of particular writers may also be used as a means of psychological verification or illustration, but with caution, since the emotions or interests of the writer may colour the facts. Such works are more important for what they unwittingly reveal.

§ 5. *Difficulties in psychological self-observation.*—The process of introspection is beset with certain difficulties. This is the chief reason why psychology is one of the most difficult of the special sciences, and why we have to spend so much time in preliminary discussions as to method, &c., before we can get to work. We cannot, as in Chemistry, take the student into a laboratory and show him, by experiment, the very facts themselves in operation. We now proceed to examine the difficulties of introspection, in order justly to estimate their force, and avoid exaggeration.

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[1] *Groundwork of Psychology*, p. 14.

(*a*) Language is largely the work of the earliest generation of men, before the reflective stage had been reached. The first natural tendency of the mind is outward, to external nature. Hence the words we use as descriptive of the mind and its operations originally all referred to facts of the material world—*e.g.*, to spatial form and position and bodily movement. When such words are given a mental reference, they become "metaphors," and will be misleading unless we guard against associations derived from their original use. The following are illustrations. The original and literal meaning of "attend" is "bend or stretch towards"; "apprehend," "comprehend," and "perceive," originally meant "take hold of" (by the hand); "memory," a "storehouse," comes to be used as if it were a set of pigeonholes in which the separate ideas are put up; "imagination" suggests the material reflection of an object, as in a glass.[1] The names given to the mind itself all had a purely material signification: thus, "spirit" meant "breath," and the most abstract of these names, "subject," contains a violent material metaphor, for it meant "something placed under." Again, we speak of an "impression" being made on the mind: this is a metaphor from the impression of a seal on wax. As a matter of fact, this word has made great mischief in philosophy. Its habitual use led the older British school of psychology to think of the mind as being like a kind of passive tablet, and to ignore the fact that the mind is always *active* in apprehending an object. In psychology we must take special pains to guard against the misleading associations of the words we have to use.

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[1] Cf. Max Müller, *Lectures on the Science of Language*, viii. (on "Metaphor").

(*b*) A special difficulty arises from the apparent transitoriness of mental states. We say "apparent" transitoriness; for what really impresses the introspector with the evanescence of mental processes is the fact that he cannot *hold them to observe them.* This is really the source of the difficulty which is indicated in the usual statements about the "fugitive character" of mental activities. They do not *wait* to be examined.[1] The objects of the other sciences are not so "evanescent." This difficulty in introspection can only be met by a *habit* of alertness in observation, which can be acquired, although to acquire it is not equally easy for all. Professor Stout says, "What is important is to acquire a general habit of alertness, a perpetual readiness to attend to the workings of our minds whenever opportunity presents itself; and it must be noted that opportunities are constantly presenting themselves; the subject-matter that we have to observe is always with us."[2] We shall not find our mental activities "evanescent" if we can learn to know them by an accumulation of occasional glances, instead of trying to make a thorough examination at one time, which entails drawing off the mental energy from the process to be observed.

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[1] Many feelings really are so fugitive as to pass unobserved.

[2] *Manual of Psychology*, p. 19 (Introduction, ch. ii., § 2).

(*c*) Our last remark brings us to another difficulty in psychological observation. It is closely related to the previous one, and is met by the same means. The observation of mental processes, or even the intention to observe them, involves a certain distraction of the mental energy. In other observations we can devote all our energy to the object, but here the mind is at once the object observed and the subject observing. In joy, for example, the mind may be at first absorbed; but when the psychological instinct awakes to examine this state, the mental activity is divided, for part has gone to the work of psychological observation. If the mind concentrates its activity in observing, the process observed loses in vivacity, or in many cases entirely disappears. The more violent passions and emotions are calmed or even killed by the attempt deliberately to observe them; and the same is true of intense attention or absorbed thought,—the creative impulses of the artist and the thinker. To concentrate attention on the process, in such a case, would ruin it. Yet a fleeting observation may be made, if the habit has been acquired, without throwing the mind off the rails. The process has, so to speak, a momentum of its own, which carries it on during the inappreciable fraction of a second during which the observer takes the introspective attitude. The less the mind is absorbed in its object the easier introspection ought to be. We must avoid the common error of supposing that the whole force of the mind is engaged in every mental process. It is certainly possible to carry on the process of observing a calm non-engrossing mental activity along with the activity itself.

The point we insist on is, that while observation of the mind is beset with special difficulties, these difficulties can be overcome by training and practice. This is, after all, no peculiarity of introspection. We can all observe enough of our minds to make certain simple and obvious distinctions—*e.g.*, between thinking, feeling, and willing. So, when looking at the star-lit sky at night, we can all see enough to distinguish between, say, planets and fixed stars. But the multitudinous observations on which modern theories of the solar system and the stellar universe are based could only have been accumulated, as they have been, by the efforts of generations of trained workers. The individual observer acquires skill through the accumulated results of a series of trials, however unsuccessful he may have been at first; and in the process he derives immense help from the work of his predecessors, from whom he learns what to look for and where to look for it. The same may be said of psychological observation.

The student has a mind—if we may so put it—constantly at hand, and he cannot too soon accustom himself to "look within" in order to test and amplify the statements made in this book.

On the aim and scope of Psychology, see Sully,* *Human Mind*, vol. i., ch. i.; Stout,* *Manual of Psychology*, bk. i., ch. i.; on Method, Sully,* ch. ii., and Stout.* Every treatise of course begins with a discussion of these subjects; but we may in addition also refer specially to Höffding, *Outlines of Psychology*, ch. i.; to James, *Principles of Psychology*, vol. i., ch. vii.; to Ward's article, "Psychology," in *Ency. Brit.*, vol. xx.; and to the excellent article, "Psychology," in Baldwin's *Dictionary of Psychology and Philosophy*, vol. ii.

We must emphasise the remark that the so-called "objective methods" of psychology—*i.e.*, the study of the mental life of children, animals, &c. (cf. Sully, ch. ii., §§ 4-7, 12-15), are not merely "methods" subordinate to introspection, but distinct branches of the subject (see ch. ii., below).

A general objection to the scientific value of introspection has been made by Comte in his *Philosophie Positive*, and adopted and carried farther by James (*Principles*, vol. i. pp. 185-192; cf. *Text-Book of Psychology*, p. 467). Comte's argument may be summed up thus: it is never possible for the mind to do work and at the same time attend to it. J. S. Mill (*Essay on Comte and Positivism*) replied that a process may at any rate be studied through the medium of *memory*, and that our best knowledge of mental processes is acquired thus; we reflect on the process, when it is past, but when the impression on the memory is still fresh. This is quite true; but some writers carry Mill's view to the extreme point and say that the mental state observed is *always* past before the psychologist can begin to observe it, and that we can have introspection *only* through memory. "A post-mortem is the only possible examination of mental states," says Professor James; or in the usual phrase, "introspection is only retrospection." Taken strictly, this is an extravagant paradox. It implies that in what we call "now," in that focus of experience which is not the abstraction of a mathematical point or indivisible moment but is the actually existing present, we have no kind of direct hold on our *present mental existence;* we only remember that we existed immediately before. It may be maintained, on the contrary, that we could not think of the immediately previous existence of any process unless we had a direct hold on something with which its *previous* existence is contrasted; and this something is simply its *present* existence. Carried to its legitimate conclusion, the argument criticised would show that every perception of a process (in the mind or in the outer world) is not direct, but is only possible through memory. But it is never true that the process to be observed must be past *before we begin* to observe it; it *may* be past before our observation is *completed.* George Henry Lewes (*Study of Psychology*, p. 86) compares observation of a process of mind and observation of a moving body: "The movement we observe is really effected before our observation is completed. It was a series of successive positions in space; we re-travel through that series ideally, connecting the point of arrival with the point of departure. It is because we recall these points that we know there has been a movement. It is thus also with the movements of thought. The part of pure observation, or *direct beholding*, is the same in both ; and in both it has to be completed by reflection, *indirect beholding*, which re-forms the particulars into a whole." What is here called "indirect beholding" is really the element of memory in perception ; but *this memory is not the whole of the process*, which involves a "direct beholding" as well. For some important observations to the same effect see Stout, *Groundwork of Psychology*, p. 13. The only truth in the doctrine that "introspection is only retrospection," appears to be saved in the view worked out by Professor Stout and one of the present writers, that the mental process observed is never simply identical with the observation of it (see Stout, *Manual of Psychology*, p. 59, and *Analytic Psychology*, vol. i. pp. 44, 46 ; Mellone, "The Nature of Self-knowledge," in *Mind*, new series, vol. x., No. 39).

CHAPTER II.

DIFFERENT BRANCHES OF PSYCHOLOGY.

§ 1. *Analytic Psychology.*—The introspective method, as described in the last chapter, is essential to psychology; but no psychologist has ever limited his procedure to introspection alone. It has always been supplemented (i) by investigation of the products of mental activity, in order to infer from those products what were the processes that produced them; and (ii) by experiment, which is simply the employment of introspection under test conditions.

We have already said that self-observation and observation of other minds are two processes which supplement each other and act and react on each other. They have done so in the growth of the mind from infancy, and in the development of mind in the race; and in psychological introspection they must do so still. All psychological reference to other minds, strictly speaking, comes under the head of "observation of the products of mental activity in order to infer from those products the mental processes that produced them"; for it involves observation of the words and actions of others, and inference (in the light of our own conscious experience) as to the mental processes underlying those actions. This field of indirect or inferential observation may be further extended to biographies of remarkable men, men of genius, or criminals; and to ideal characters in novel or drama. The works of a writer like Shakespeare enlarge our knowledge of human nature. We may also appeal to the study of language, for in language we have most directly embodied the nature of thought. When psychology is treated thus, and founded mainly on introspection and on such additional means of verifying and helping introspection, we have what is called *Analytic Psychology* (on "Analysis" see ch. i., § 3).

Analytic psychology is represented in Professor G. F. Stout's *Analytic Psychology* (2 vols., 1896), which is probably the best work among those written specially from this point of view; also in Professor G. T. Ladd's *Psychology, Descriptive and Explanatory*, and in Professor J. M. Baldwin's *Handbook of Psychology* (2 vols.) Among foreign works the following are deserving of special mention, as written from the same standpoint: Lipps, *Grundtatsachen des Seelenlebens;* Fouillée, *La Psychologie des Idées-forces* (2 vols.), where great stress is laid on the conception of mind as before all else dynamically active; Brentano, *Psychologie vom Empirischen Standpunkte* (incomplete, but containing valuable discussions of principles).

The field of inference from mental product to mental process has, however, been extended very much farther than we have yet indicated, and has given rise to new investigations, which have practically become, not additional "methods," as some text-books carelessly call them, but distinct branches of the subject. On this account it is no more possible to write a book on psychology as a whole than to write one on mathematics as a whole. We must, however, briefly indicate the general character of these further branches. On this subject every beginner should read Professor Baldwin's interesting little volume, **The Story of the Mind.*

§ 2. *Individual Psychology.*—We said above that personal peculiarities have no interest for the scientific psychologist. But mental characteristics which are really personal peculiarities may become objects of a genuine scientific interest, when it is sought to know how far such individual variations extend, and how they arise. A distinct branch of the subject has taken shape, known as *Individual Psychology*, and it aims at dealing with these problems. In this department work has been done, for example, on the psychology of Temperament, on the characteristic differences of the Sexes, on forms of Genius, on forms of Mental Defect, and on Criminal Characteristics.

Cases of mental defect have much instruction to offer for understanding the working of the normal mind: thus, in the case of those born blind, we may inquire into the nature of the Imagination. Most remarkable are the cases of Laura Bridgman and Helen Keller, the former of whom became a blind deaf-mute[1] in her third year, the latter in her eighteenth month. Both of them were successfully educated notwithstanding these defects; and Helen Keller attained high proficiency in Classics and Modern Languages. Miss Keller's *Story of my Life* is a work of the greatest interest.

See Galton, *Inquiries into Human Faculty;* and for further references see the headings Attention (defects of), Crime, Criminal, Hearing (defects of), Genius, Memory (defects of), Sexual Characters, Speech (defects of), Temperament, Type (mental), Vision (defects of), Will (defects of), in Baldwin's *Dictionary of Philosophy and Psychology;* also the heading "Bridgman (Laura)" in the same work.

§ 3. *Abnormal Psychology.*—When mental defects are so serious as to constitute a disease of the mind, a real mental disorder, we find a vast field of inquiry opened up, known as *Mental Pathology*, which has a literature of its own. Just as we have Physiology describing the normal functions of the human body, and Pathology describing its diseased functions, so we have a pathology of mind or study of the diseased varieties of consciousness. To this belongs the literature of the forms of Insanity.

The study of mental defects and the study of mental diseases are sometimes spoken of together as *Abnormal Psychology*. This term is also used to describe any state of mind which deviates to a more or less serious extent from what is regarded as normal or usual. Sleep and the dream-state, on account of the extreme difficulty of investigating them, are counted as abnormal states of mind. The Hypnotic state (in which the will of the subject seems to be laid asleep) and Somnambulism go somewhat farther from the normal. Mental life in these conditions has been largely investigated, chiefly by the French Schools of Paris and Nancy. To Abnormal Psychology belong the phenomena of Hallucination and Illusion, and such experiences as those of De Quincey under the influence of opium, as described in his *Confessions of an English Opium-eater.*

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[1] A "deaf-mute" is one in whom defective hearing (congenital or acquired in early life) hinders or prevents the acquisition of the power of speech.

The extent of the work done in the department of Abnormal Psychology will be seen from the references given under the headings Delirium, Delusion, Dream, Hallucination, Hypnosis, Illusion, Insanity and Sanity, Insomnia, Psychic Effect of Drugs, Sleep, Suggestion, in Baldwin's *Dictionary.*

§ 4. *Genetic Psychology.*—We have now to introduce a subject of the greatest importance.

We assume that the reader is familiar with the idea of Evolution or Development. The former term is more often used of the history of the animal series and man; the latter, of the unfolding of the powers of the individual mind. It is with the latter that we are specially concerned. Development involves change, but the change is of a particular kind. Contrast the process by which the sea wears away a limestone shore, or rivers and wind and weather carve out channels among the rocks; and the process by which a seed becomes a complete plant or shrub or tree. The first is a typical instance of mechanical alteration, the mere redistribution of material into new combinations; the second is a case of organic growth. In both cases there is the continual appearance of new characteristics; but in the germination and growth of the seed there is no mere manufacture of new qualities out of old ones, no mere persistence of the old along with the new. Such notions are inadequate to express the intimacy of the connection between old and new in growth; for here the old actively *affects* the new so closely that it has become customary to speak of the later qualities as evolving (developing, or growing) *from* or *out of* the earlier ones. Taken literally, this is inadmissible; or rather, it is meaningless, unless it signifies that the new qualities *are simply* the old ones, which is obviously false. If A has gone, and B has come, then it is false to ascribe everything to A. When we speak of mind being evolved or developed, and use our words with scientific accuracy, what we mean is this. Between the highest development of a mind and its first dim awakening, there is no crossing of a boundary into an entirely different kind of being, not even so much as is involved in the caterpillar changing into a moth. There is no point at which we can say, here a new quality appears entirely unconnected with anything that has gone before. It is connected with it in the intimacy of living growth. Hence when we speak of the mind as a living thing which grows, which has an environment, and so forth, we are employing ideas which actually express far more of the truth about the mind than if we employed ideas borrowed from Physics or Chemistry.

Now there is a perfectly clear and very important question which may be asked concerning the development of the normal mind. What is the order in which the successive phases of mental process appear, as the mind progresses from its first beginning to maturity? To make the meaning of this question clear, we take some of the most prominent phases of mental life—*e.g.*, *perceptions* of one's own body and of objects in the outer world in space and time; distinct *memories* of the past; the beginnings of free *imagination;* the beginnings of abstract *thought;* deliberate *volition;* the consciousness of *one's self* as a separate person, with character, dispositions, and desires of one's own. Now, in order that perception may be able to develop, as we shall see, certain simpler processes must have preceded; in order that memory and imagination may be possible, the capacity of perception must have been first acquired. It is possible to work out, in detail, connections of this kind; and when this question, of *order of development* in mind, is made prominent, we have what is called *Genetic Psychology.* Genetic and Analytic Psychology are closely connected—indeed, the former would be impossible without the latter: in order that we may ascertain the order in which the successive forms of feeling, thinking, and willing successively emerge (the question of Genetic Psychology), we must know what these forms are (the question of Analytic Psychology).

The treatment of the subject is mainly genetic in Ward, article "Psychology" (*Encyclopædia Britannica*, vol. xx.); Stout,* *Manual of Psychology* (2nd ed.), with which should be read the same author's *Groundwork of Psychology;* Baldwin, *Mental Development in the Child and the Race*, and *Social and Ethical Interpretations in Mental Development;* Jodl, *Lehrbuch der Psychologie.*

§ 5. *Child Psychology*, *Comparative Psychology*, *Race Psychology.*—(*a*) Great light is thrown on Genetic Psychology by the observation of children; so much so, that in recent years *Child Psychology* has become a distinct branch. Its task is to observe the development of the mind from the earliest days through childhood.

On this subject we may refer to: Perez, *First Three Years of Childhood* (tr. from the French); Preyer, *The Mind of the Child* (tr. from the German; most elaborate and comprehensive); Sully, *Studies of Childhood;* Shinn, *Notes on the Development of a Child;* also Baldwin, *Mental Development* (as above); and heading Child Psychology, in Baldwin's *Dictionary.*

(*b*) The development of mind through the series of forms of animal life up to man has been studied, and results of great interest arrived at. This is known as *Comparative Psychology:* this term is used because the investigation involves a comparison of the developed mind of man with the lower manifestations in animal life, and also of these forms with one another. On the basis of careful observations we form an idea of what the development of mind has been through the history of the animal races up to the beginnings of the human race.

Romanes made many observations, recorded in his *Animal Intelligence*, which he endeavoured to theorise in his *Mental Evolution in Animals.* It must be said, however, that Romanes was not a competent student of what we have called Analytic Psychology, and his researches in animal psychology suffer accordingly. More recent and careful work has been done by Lloyd Morgan, *Animal Life and Intelligence*, *Habit and Instinct*, and *Comparative Psychology* (2nd ed.), and by Hobhouse, *Mind in Evolution.* See also Baldwin, as above; Wundt, *Human and Animal Psychology* (tr. from the German), and heading Evolution (Mental) in Baldwin's *Dictionary.*

(*c*) The psychological characteristics of primitive peoples (tribes or nations) give rise to *Folk Psychology*, or *Race Psychology,* deriving much of its material from Anthropology and Folk-lore. Anthropology investigates the total life of primitive man,—savage beliefs, superstitions, religions, languages, laws, art, &c., all of which are mental products, and have much to tell us of the tribal or national mind that produced them. When we pass to more civilised peoples, the study is called Sociology instead of Anthropology: the same result holds good; for religion, laws, art, &c., are the truest indications of mental life.

Professor Wundt has in course of publication a great work dealing exhaustively with this subject: *Völkerpsychologie*, of which two vols. have appeared, dealing respectively with the development of Language and the development of the Imagination. For the English reader the following deserve special mention: Tylor, *Anthropology*, a convenient handbook, giving selected lists of authorities; the same writer's large work, *Primitive Culture* (last ed.); Lubbock, *Origins of Civilisation;* Spencer, *Principles of Sociology* (3 vols.; Spencer's doctrines are summarised by F. H. Collins, *Epitome of the Synthetic Philosophy*); the writings of Andrew Lang; and headings Anthropology, Folk-psychology, and Sociology, in Baldwin's *Dictionary*.

In these branches of psychology there is always the possibility of a most serious error being made. We may misinterpret the facts by assimilating them too closely to our own experience. Thus, we may attribute to the mind of the child, the animal, or the savage, a much higher degree of intelligence than properly belongs to it. We may suppose, for instance, that the expression or the gesture means the same for the child or the animal as for an adult at our own mental level. Tact, and the cultivation of that true scientific spirit which destroys prejudices and preconceptions, are the only safeguards here.

(*d*) Some writers speak as if there were yet another branch called Social Psychology. It does not appear that there is any ground for separating "Social Psychology" from "Folk Psychology," except in so far as it is simply one part of the genetic psychology of the normal mind, due to the fact that we cannot begin to understand the development of the individual mind unless we recognise the influence of the *social factor* in that development. Human life from the beginning has been social life; and Society develops powers which do not exist in the individuals composing it, and by which the development of the individuals is deeply influenced. The condition of social development reached at any place and time forms, in a sense, a real life (it has been called the General Mind), distinct from the various individual lives, though intimately related to them. It thus forms a real determinant of their individual growth. The General Mind expresses itself in Language, Law, Custom, Public Opinion, and thus controls the development of every one's thought and conduct.

"Driven," says G. H. Lewes, "to seek beyond the bodily organism and its aptitudes for the origin of a large portion of our mental life, we find it in the constitution of the social organism of which we are the units. We there find the impersonal experiences of tradition accumulating for each individual a fund of Knowledge, an instrument of Power which magnifies his existence. The experience of many becomes the guide of each; they do not all perish with the individual; much survives, and takes form in opinion, precept, and law, in prejudice and superstition. The feelings of each are blended into a general consciousness, which in turn reacts upon the individual consciousness. And this mighty impersonality (the General Mind) is at once the product and the factor of social evolution. It rests on the evolution of Language; . . . without Language, no Society having intellectual and moral life; without Society, no need of Language. Without Language, no Tradition; without Tradition, no elaboration of the common arts and skill which cherish and extend the simplest products of the community; without Tradition, no Religion, no Science, no Art." "By means of Language," says Lewes elsewhere, "the individual shares in the general fund [of experience], which becomes for him an impersonal objective existence. To each it appeals. We all assimilate some of its material, and help to increase its store. Not only do we find ourselves confronting Nature, to whose order we must conform, but confronting Society, whose laws we must obey. . . . There are men, and there is Humanity; there are minds, and beside the individual mind there is the General Mind. With the Individual point of view we must always combine the General."—(*Study of Psychology*, pp. 80, 160.)

The student will find that the importance of this *social factor* in the development of mind is well pointed out in the writings of Prof. G. F. Stout and Prof. J. M. Baldwin. Such questions as the development of the idea of an outer world, and of self as a distinct personality, have been put in a new light by these inquiries.

§ 6. *Physiological and experimental Psychology.*—We have said that mind as we know it is not "pure spirit," but is always embodied mind: all conscious states in experience are connected with a body or material organism. In fact, whatever opinion we may hold as to the real connection between the mind itself and the bodily organism, there is no doubt that only by means of the body can the mind become acquainted with its surroundings and communicate with other minds.[1] In order that mental life should be able to show its existence to other beings, it must be by means of a body, and in particular by means of a nervous system. In this sense we may say that the manifestations of mind —observe, we do not say "mind," but the "manifestations of mind"—depend entirely on bodily conditions. This is specially evident in two ways: we are dependent on the sense-organs for our acquaintance with the outer world, and on the muscular organs for our power to act on the outer world. Sensation and Movement are thus intimately dependent on the body. These are, in a sense, the two ends of mental life, corresponding to incoming and outgoing nerve-currents. These two departments of mental life may therefore be studied to great advantage in connection with the physiological facts on which they depend. This is much more difficult in the case of the higher intellectual processes; for, although the whole analogy of science (as we shall see) goes to prove that for every change in the activity of the mind there is a change of motion in the brain, still, the physiology of the brain is not sufficiently advanced to throw much light upon the psychology of the comparatively complex mental processes. But in the simpler phenomena of sensation and movement, physiology is of great assistance. For this reason there has grown up in recent years yet another distinct branch of the subject, known as Physiological Psychology or Psycho-physics, the study of the facts of mind—that is, the comparatively simpler or less developed facts of sensation, imagination, and movement—in immediate connection with their bodily conditions. The term Physiological Psychology usually includes investigations which, though they take account of the presence of mental states, are purely physiological: such are measurements of the variations in the circulation of the blood, in the temperature of the brain, in respiration, in muscular power, which accompany various kinds of mental activity; and, again, investigation of the question, what parts of the brain are specially active when a particular mental process is going on?

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[1] It is possible that there are obscure exceptions to this statement, and that the alleged phenomena of "thought-transference" and "clairvoyance" do really indicate the possibility of a communication between mind and mind by means other than the ordinary channels of sense. But the nature of those means is so little understood that we are compelled to leave them out of our account.

Physiological Psychology is also called Experimental Psychology, though it is really only a part of it. In *experiment*, we are not content to take the facts as we find them: we interfere with them, and arrange them for ourselves, in order to see what will happen. An experiment is thus a "question asked of Nature." Now we have enough control over some of the bodily conditions of mental processes to be able to ascertain in some cases the laws of correspondence between them by varying the bodily process. Thus, it is possible to test by experiment the way in which the intensity of a sensation (of sound, for instance) is affected by changes in the intensity of the stimulus: by dropping pith balls of known weights from various distances on to a glass plate, the changes in the stimulus to the sound-sensation can be exactly graduated. Or, again, it is possible to measure the duration of mental processes in some cases with exactness: for instance, the time taken up by the perception of a sense-stimulus (as an electric spark) and the giving of a prearranged movement in response to it.

Such experimental work has produced a harvest of suggestive facts, a great number of which have been collected and described in Ladd's *Elements of Physiological Psychology*.

The most important workers in this field have been Weber, Fechner, Lotze, and Wundt. Wundt's great work, *Physiologische Psychologie* (1874; 5th ed., 1903), is now in course of translation from the German; see also his smaller work, *Grundzüge der Psychologie* (4th ed., translated under title, *Outlines of Psychology*). Külpe's *Outlines of Psychology* (translated) gives in moderate compass a careful treatment of the subject from the same point of view. Ebbinghaus' *Grundzüge der Psychologie* (in course of publication) is very valuable, and fully abreast of present research; the same may be said of Titchener's *Experimental Psychology*, a Manual of Laboratory Practice, in four parts. For further references, see Baldwin's *Dictionary*, under headings "Psychology (experimental)," and "Psychology (physiological)," and the works mentioned above.

It is obvious that Experimental Psychology does not and cannot dispense with introspection; it is simply the employment of introspection under test conditions.

Some writers on Physiological Psychology cannot be acquitted of a bias towards making the physiological process the reality, and the mental process an unsubstantial accompaniment of it—an "epiphenomenon" of it, to use a term which has been bandied about in these disputes. Most usually this bias betrays itself in the general statement that, from the scientific point of view, the final explanation of mental processes is to be found in physical processes, and in particular, that we have explained a mental change when we have ascertained the brain-change which it accompanies. This position we repudiate as inconsistent with present knowledge; but we shall freely use physiological *illustrations* of psychological principles, for they are often very suggestive.[1]

The view criticised has been stated in its most precise form by Professor H. Münsterberg of Harvard, whose position may be expressed thus. If large letters stand for processes in the brain, and small ones for the accompanying mental processes, we may represent successive states of conscious bodily life thus—

$$\begin{array}{c} \ldots\ldots B \quad C \quad D \ldots\ldots \\ \ldots\ldots b \quad c \quad d \ldots\ldots \end{array}$$

without attaching any significance to alphabetic order. Then, although we cannot say that the connection between B and b affords any scientific explanation of b, or, similarly, in the case of c, d, &c.; yet we can and must say that the only scientific explanation of the connection between b and c, and c and d, lies in the connection between B and C, and C and D. We must reply as above: it is conceivable that physiology and psychology might ultimately become as one indivisible science; but in the present state of our knowledge, the number of cases where the physiological connection gives an explanation (as distinguished from an illustration) of the psychological one is extremely small. The student should consult Professor Stout's valuable observations in his *Analytic Psychology*, vol. i. pp. 28-34.

Finally, the student should bear in mind that experiment is not limited to the physiological accompaniments of mental states. It is possible, though very difficult, to devise experiments which throw light on the laws of association and revival of ideas, and even on those of the higher mental processes.

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[1] This is particularly true with respect to the *hierarchical* conception of the central nervous system, which is likely to gain a far-reaching application in the future progress of Physiology (see Preface).

FURTHER REFERENCES TO GENERAL WORKS.

To the references given in previous sections of this chapter to works dealing with the several branches of psychology, we may add the following: Ward's article *Psychology*, in the supplementary volumes of the *Encyclopædia Britannica* (vol. xxxii.), is a valuable supplement to his original article in vol. xx., already referred to. James' *Principles of Psychology* (2 vols.; abridged in his *Text-Book of Psychology*) combines Analytic and Physiological Psychology, and contains some of the most brilliant introspective work ever put forth in a book professedly dealing with psychology. Sully's *Human Mind* (2 vols.) is a praiseworthy attempt to reconcile divergent tendencies among present-day psychologists, and contains no extreme views; but it has the inevitable defect of this quality—viz., that some important difficulties are smoothed over. Its chief value lies in its completeness as a survey of the ground, and the clearness with which the material is arranged.

The writings of Bain and Lotze have still much more than a merely historical interest. The last editions (fourth) of Bain's *The Senses and the Intellect*, and *The Emotions and the Will*, contain much valuable psychological matter. His principal positions are explained clearly in his *Mental and Moral Science*. Lotze's *Medizinische Psychologie* is out of print and scarce; parts of his *Microcosmus* (2nd ed.) and his *Metaphysics* (Eng. tr., vol. ii., part iii.) deal with psychology. His views are summarised in convenient form in his *Outlines of Psychology* (Eng. tr.; dictated portions of University lectures).

CHAPTER III.

THE MOST GENERAL CHARACTERISTICS OF MENTAL LIFE.

§ 1. *Continuity of Consciousness.*—By the most general characteristics of mental life, we mean those which may be assumed to hold of all mental life above the level represented by such creatures as the oyster.

We have said that mental processes only exist as part of some one's embodied life, the life of some individual man or animal. It is an embodied life, and it is an individual life. We have seen some of the points where psychology touches physiology, in consequence of what is implied in the term "embodied life." We have now to see what, for psychology, is implied in the term "individual life." Every mental life is individual, in the psychological sense, if it has *continuity.* What, then, do we mean by psychological continuity? We mean that, however different the processes may be which are going on in the mind together, they are not separated from one another by something which is not mind, as pieces of land may be separated by water, or musical notes by intervals of silence.[1] We must postulate this continuity in mental life, not only at particular times, but throughout the whole of its duration. "At any given moment," says Professor Ward, "we have a field of consciousness psychologically one and continuous;

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[1] Ward, article *Psychology*, p. 45*b*.

at the next, we have not a new field but a partial change within this field." Experience shows that the mind may undergo very great changes in the course of time; but however great the changes are, they are continuous. It may be asked, what is to be thought of the apparent interruptions of mental continuity during sleep and in so-called unconscious states? The answer is, that we do not know enough about these states to dogmatise and say that they are real breaches of continuity. They are certainly interruptions of intense or vivid conscious life; but since we do know that these intervals are bridged somehow in reproduction and recognition of past experiences, we are justified in saying that there is a real bond of connection which still survives even in what we call unconsciousness. Any mental experience leaves an effect which survives, and through which the former experience may be reproduced, and when reproduced, may be recognised. Thus, something reminds me that thirty years ago, in early childhood, I was very much frightened under certain circumstances. I recall the circumstances (though not in great detail), the feelings they called forth in me, and the actions that followed. This is a typical case of the reproduction of a past experience, and the recognition of it as mine. Such facts imply an inner continuity to which the material world affords no parallel.

In some abnormal states of mind, as in cases of what are called alternations of personality, we seem to have one series of mental processes entirely suspended for a while, and its place taken by another which is as different from the former as if they had belonged to two different minds inhabiting different bodies. And the former series may be resumed after the interruption as if the latter had never existed, and the latter again may be resumed as though the former had never existed.[1] Yet even here we have no evidence of a fundamental and absolute breach of continuity.

Höffding, *Outlines of Psychology*, p. 47, well says that if we look back on our previous states of consciousness, they come before us as a series of ideas and feelings, "as a stream with succeeding waves." "It may often seem to memory as though this series were composed of independent separate units, only externally combined. Some psychologists (in particular Hume) have consequently described consciousness as a mere succession of ideas without inner bond and connection, or more precisely as the series of our possible and actual sensations (J. S. Mill)." This view rests on an error of observation, but it is an error which led to the foundation of an important system of psychological doctrine, known as Associationism. The truth is that each mental process belongs to consciousness only through its union with other processes. The conception of mind as only a series of "states" leads to insuperable difficulties, as Mill saw (*Examination of Hamilton's Philosophy*, ch. xii.) These considerations bear out what has been already said, to the effect that we cannot explain mental development as being built up out of elements which are assumed to be separate after the analogy of the atoms assumed in Chemistry, as J. S. Mill maintains (*Logic*, bk. vi., ch. iv.; see Stout's criticism, *Manual*, bk. i., ch. iii.)

This theory of mental development is exemplified in the writings of the English "Associational" school: Hume, *Treatise of Human Nature*, ed. by Green and Grose, 2 vols.; ed. by Selby-Bigge, 1 vol.; James Mill, *Analysis of*

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[1] For cases see James, *Principles*, vol. i. p. 379ff. James quotes the case of an epileptic man "who for seventeen years had passed his life alternately free, in prisons, or in asylums, his character being orderly enough in the normal state, but alternating with periods during which he would leave his home for several weeks, leading the life of a thief and a vagabond, being sent to jail, having epileptic fits and excitement, being accused of malingering, &c., &c., and with never a memory of the abnormal conditions which were to blame for all his wretchedness."

the Phenomena of the Human Mind, ed. by J. S. Mill, Bain, and Findlater, 2 vols.; Bain, *The Emotions and the Will* and *The Senses and the Intellect.* Of these books, the two last contain specially valuable and suggestive psychological work.

A treatment of the mind, similar in principle, though differing greatly in detail, was worked out by Herbart: see Stout's account of the writings of this school, *Mind*, old series, vol. xiii.

§ 2. *The psychological "Law of Relativity."*—While every one's mental life is one life, in the sense explained, its continuity exists in the midst of change. We see the continuity of mental life *in operation*, so to speak, in the fact that the manifold changes of consciousness cannot occur without having an effect on one another.

Hobbes expressed the principle that consciousness is change by saying, *idem semper sentire et non sentire ad idem recidunt.* If we understand this to refer to the field of consciousness as a whole, it is obviously true: the more nearly all changes fade, the more nearly we approach to unconsciousness. What is called hypnotism, or artificially induced somnambulism, often begins by fixed attention to one unchanging impression which monopolises the whole of consciousness. But any particular impression which does not occupy our whole attention may continue unchanged for any length of time. The most that could happen to such an impression is that it should become "subconscious"; but as we shall see, a "subconscious" impression is not the same as no impression: *idem semper sentire* in such a case can never be the same as *non sentire.*

The principle that the manifold changes of mental life can never occur without having an effect on one another, is known as the *Law of Relativity.* Every conscious process, besides having what may be called an intrinsic character of its own, is affected by its relations to other processes in the series of mental states; its intensity, quality, tone of feeling, value in combination, depend in part on the relations in which it stands to other processes.

These relations that lead from one distinct process to another are themselves processes of consciousness; but in realising them, consciousness moves so quickly that *in introspection* they may be overlooked. They are like flights to a conclusion; if we try to look at them in the act of moving, "the rush of the thought is so headlong that it almost always brings us up at the conclusion before we can arrest it; whilst if we wait until the conclusion be reached, it so exceeds them in vigour and stability that it quite eclipses and swallows them up in its glare." If, for instance, some one says to us, "wait for me," or "look at this," or "listen to that," the little words "for," "at," "to," express actual and complex mental processes which are very difficult to analyse introspectively, because the mind rushes so quickly between the processes represented by the two chief words in the sentence.

Professor Stout has stated the Law of Relativity thus: "Mental development depends on modes of consciousness being determined by their psychological relations, and subject to modification accordingly."[1] This is true of all mental processes,—sensation, perception, cognition, feeling, volition. The reader will notice that the law is stated in so general a form that it does not give much information. If he asks, what in detail are the psychological relations under which mental states affect one another, the answer is worked out in the detailed exposition of psychology itself; and the gaps in our present psychological knowledge—and they are many

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[1] *Manual*, p. 71 (bk. i., ch. ii., § 1).

—are simply cases where the relations in question have not been ascertained. In this place we can only illustrate the working of the law by mentioning a few of its most obvious applications in the field of perception. It is well known that distinct colours seen simultaneously have an important effect on one another. A patch of grey looks brighter against a black background than against a white one. Similar facts are observed in the case of sound. After a harsh noise, silence is a positive feeling, and a pleasant one. A note, when the scale is sung up, sounds unlike what it does when the scale is sung down. In music, the whole artistic effect comes from the way in which one set of sounds alters our feeling of another.

The principle of relativity, in its psychological reference, is stated differently by different writers, but there is no disagreement as to the main facts. Hobbes' formulation of it will be found in his *Elementa Philosophica de Corpore*, Molesworth's edition of the *Latin Works*, p. 321 (pt. iv., ch. xxv., § 5). Bain states the principle in an extreme form, *Mental and Moral Science*, p. 83, on which see Ward, art. *Psychology*, 49*a*-50*a*. See also James, *Principles*, vol. i. pp. 237-270 (that the "stream of thought" is "sensibly continuous") and vol. ii. pp. 9-30 (on the "relativity of knowledge" and the law of contrast); and a clear summary of the facts in Höffding's *Outlines*, pp. 114ff (sensation), 216ff (cognition), 275ff (feeling), 314, 329 (volition).

The fact that conscious life is realised in a continuous series of prominent[1] or influential states connected by transitional states, which are less prominent, accounts for the prevalence of the theory which makes mind consist of a succession of separate data. Distinct processes were taken for separate ones, and the mind became a "manifold" broken into bits. The opposite extreme view would be to make the transitional (relational) processes everything, denying any intrinsic character to any mental process, and making it only a transition to something else. This view is suggested by some of Bain's expressions, and is examined by Ward, *loc. cit.*

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[1] "Prominent" from the introspective point of view.

This discussion introduces us to a principle which we shall meet again, and which has an important bearing on every detail in psychological science,—that the "prominent" mental states—those which we most easily become aware of—form but the very smallest part of our minds as they really live.

§ 3. "*Focus*" *and* "*margin*" *of consciousness.*—In our first chapter, § 2, we spoke of consciousness as essentially having degrees of intensity; it declines in intensity as we sink gradually to sleep; it increases in intensity as we awake. As the intensity of consciousness decreases, it does not break up into separate parts; differences and changes in it, which were distinct, begin to fade away. We can imagine this process going on, but its final result would be a formless state of feeling impossible to describe. As consciousness increases in intensity, it embraces a larger number of objects or details, and the details themselves and their relation to one another grow more distinct. These general facts are sufficient to familiarise us with the notion of consciousness as a thing of degrees, of "more or less."

This is experienced in ordinary waking consciousness, where we always find different degrees of consciousness at the same time. There is, first, the region of fullest attention, where our mental activity is most intense; this is called the "focus" of consciousness. Then there is the region of dimmer consciousness, lying round the focus; this has been called the "margin" of consciousness. Ideas and impressions are constantly passing from the focus to the margin, and *vice versa.* If, in looking at a picture, I scrutinise the execution of a single detail, that is the focus, and the rest of the field of vision (as long as I continue specially attending to that detail) is the margin. If I have forgotten where I placed a certain object yesterday, and with effort try to retrace in memory, in order, everything that I did on that day, I have a series of ideas (of my proceedings) which successively occupy the focus of consciousness, while all the sights, sounds, feelings, &c., which enter into my consciousness at the same time are only marginal. If I am sitting in a railway station waiting-room, reading a book which is interesting but not difficult, there may be continual noise from persons passing in and out and talking, from the arrival and departure of trains, from the street outside; and not only hearing but all my senses are appealed to; but while I am intent upon the book, the ideas suggested by the printed words are in the focus of consciousness, and all the other experiences in the margin.

The reader should never take on trust any illustrative descriptions of psychological situations; he should test them by observing similar situations for himself.

The focus and margin together make up the "field of consciousness." This field never has any definite limits, and may vary greatly in extent. The farther from the focus, the less clear the ideas; and it is **impossible to say where consciousness leaves off.**

§ 4. *Subconscious processes.*—The important fact mentioned at the end of the last section suggests that there is another degree of consciousness in which mental processes do really exist, but are unable to make themselves singly felt. In more exact language, they are not intense enough to become objects of voluntary attention or to attract attention to themselves. Such processes are said to be *subconscious.* In order to attract attention, they must at least appear in the margin of consciousness (the second degree). On the other hand, marginal processes may pass into subconsciousness. Let us return to our last illustration. If the book which I am reading grows more difficult as I go on, and I am still interested in it, I may become "wholly absorbed" in it, so that all the noises, sights, sounds, &c., around me make not even marginal impressions on my mind, and I should not even hear a remark addressed to me. In this case, impressions that were before in the margin of consciousness have sunk into subconsciousness.

These subconscious impressions really have the attribute of consciousness; we must not, as many writers do, extend the meaning of the *subconscious* until it includes the *unconscious*. A subconscious impression, we repeat, is one which, when it occurs, is so feeble as to be incapable of diverting attention to itself or of being voluntarily attended to. But it is not unconscious. This appears, for example, if we are quick enough in turning *memory* on it. If some one shakes you while you are reading, you can sometimes catch the remark he uttered before shaking you, though if he had left you alone you would never have known that he spoke at all.

The reality of subconscious processes is best exemplified in what may be technically termed "undiscriminated parts of a discriminated whole,"—where processes of mind, singly unnoticed, contribute to a total effect which is noticed. When we are looking at a distant forest, we see an expanse of green in which we certainly can discern no parts corresponding to the single leaves, nor even, perhaps, any corresponding to the single trees. It is not, of course, to be supposed that each leaf affects the mind separately; but the combination of so many waves of light certainly produces a change in the brain to which corresponds a compound sensation whose component parts are *subconsciously combined* into one expanse of colour. A similar remark applies to the hearing of the distant murmur of the sea. The many separate waves of the sea produce a multitudinous vibration of the air; and this again affects the brain, and to this process there corresponds a sensation which is by no means so simple as it appears in consciousness to be. That a sensation can appear more simple than it really is,—in other words, that it may consist of different sensations subconsciously combined,—is illustrated by a well-known fact in the theory of music. The characteristic tone-quality, timbre, or clang[1] which distinguishes musical notes of the same pitch sounded on different instruments (*e.g.*, the note *A* on a violin and on a flute) seems to the unpractised ear a simple quality; but the trained ear can analyse it into a fundamental tone (after which its pitch is named) and a number of overtones. The difference in number and intensity of these overtones makes the difference in timbre, which is the total effect of their subconscious combination.

The experimental fact of the *just noticeable sensation* may also be regarded as illustrating a subconscious process. A physical stimulus of low intensity may affect the nervous system without a sensation arising; and not until the stimulus has continuously risen to a certain higher intensity does a just perceptible sensation appear in consciousness. This faintest discernible sensation is called the *threshold* or *limen* of consciousness for that particular sense. The threshold of consciousness may rise or fall: it rises when a stronger stimulus is required to produce the faintest discernible sensation; and when the contrary is the case, it falls. In fatigue, or when the attention is distracted, it rises; but it also varies according as it is approached from above or below. Sound a tuning-fork and hold it to your ear until the faintest perceptible sensation has died away. In this case the sensation has approached the threshold from above and passed it. But has the sensation entirely ceased? Remove the fork: the silence seems greater than before. Bring the fork again to the ear, and a faint sound is heard. This forcibly suggests that the sensation as a conscious process did not absolutely cease to exist at the point where (as its intensity decreased) it ceased to be noticed.

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[1] The technical use of this term must be distinguished from its popular use.

Subconscious processes are not limited to sensation; they occur throughout the range of memory and imagination. Here almost every one has actual personal experience of the facts. Lessons half learnt last thing at night before going to bed are better known in the morning. Problems unsolved when we go to bed are found solved in the morning when we wake. Somnambulists do rational things. We waken punctually at an hour predetermined overnight, &c. Subconscious thinking, volition, time-registration, &c., must have presided over these acts,—subconscious, and therefore unremembered.

§ 5. *Unconscious processes.*—We may ask, in the next place, whether the field of consciousness, together with the indefinite region of the subconscious, exhausts mental life. In what form, for instance, do all our acquired ideas, our knowledges and memories, exist when we are not *using* them, when they are beyond the outermost limits of subconsciousness? We are capable of recalling innumerable items of past experience; do all these items of knowledge and memory exist below the level of consciousness? and if so, what is meant by the word "exist" in this connection? One possible view is that when sensations, ideas, &c., become "unconscious," they simply sink below the level of consciousness, and retain their own individual existence, whether they are above or below, just as a material body does in rising to or falling from the surface of a pond. This theory supposes that any mental state has a conscious and an unconscious existence, and that it is the *same state* whichever kind of existence it has. This supposition cannot be directly disproved; but the more it is thought about, the more incredible it seems; and it conflicts with the principle which we have seen reason to adopt: that, while any mental state has a real intrinsic character of its own, and a real existence of its own at some particular point in the course of mental experience, it has no such separate or independent existence as would admit of its simply sinking below the level of consciousness and rising again, as if it were a fish in water.

How, then, does the totality of our mental acquisitions exist when we are not consciously using them? There are two answers, not necessarily conflicting with each other: that all these acquisitions exist in the form of a psychological disposition (mental), and that they exist in the form of a physiological disposition (cerebral).

The popular meaning of the word "disposition"—a more or less permanent tendency of mind expressing itself in characteristic ways of thinking and feeling—may be used to illustrate its psychological meaning. Thus, love, or hate, is an acquired psychological disposition, showing itself in certain overt impulses or feelings in consciousness; but it is not exhausted in these,—it persists as a comparatively permanent state below the level of consciousness. In the same way, ideas and sensations may be merged in an unconscious mental disposition, which remains as a result of the occurrence in clear consciousness of those ideas and sensations. I meet a man to-day; I do not think of him at all until I meet him again after a week, when I recognise him at once. I am able to recognise him only because my experience of the week before has left an after-effect which persists, and in its turn has an effect on my present consciousness. The same process is illustrated, again, in every *acquired habit;* each performance of an action leaves a trace, and the traces accumulate at length into a strong or even an irresistible disposition.

There are facts which compel us to the conclusion that unconscious processes of this kind are a constant factor in the development of our conscious life. "The onward flow of thought," says Professor Stout, "depends in every moment of its course on the co-operation of an organised system of conditions which have indeed been formed in and through bygone conscious experience, but which are not themselves present to consciousness. Consider, for instance, the process of recollecting a name. The endeavour to recollect is a conscious process, but its success or failure depends on another factor. It depends on the trace or disposition formed in the course of previous conscious experience in which the name has occurred. Conditions connected with this trace or disposition determine whether the name will be recalled at once or after prolonged effort or not at all. It may happen that we fail to remember the name while we are trying to do so, and that it suddenly emerges into consciousness after an interval during which we have been occupied with other matters or have been asleep. This implies that our conscious effort has set going an unconscious process which continues after the conscious effort has ceased. Now, what holds good of the attempt to recall a name holds good throughout our mental life. Whether my thoughts come to me fast or slow, easily or with difficulty, they come to me only through the co-operation of unconscious conditions. My conscious processes constantly set in operation processes below the threshold of consciousness, which in their turn give rise to new developments of conscious process. My conscious activity is never the sole factor involved. It always makes appeal, so to speak, to something else, and awaits the result, which may or may not be such as it requires."[1]

If, then, it is asked, "How do we know that psychological dispositions exist?" the answer is, that we know them by their effects in consciousness; and if it is asked "What *is* a psychological disposition?" we reply that it *is* what it *does;* and what it does is to produce certain conscious states, and to a certain extent control mental operations of which we are conscious, as Professor Stout has shown.

Many psychologists greatly dislike the idea of there being anything in the mind which is not in itself amenable to introspection under scientific tests; and the supposition of psychological dispositions finds little favour with them. "You admit," they say, "that these supposed psychological dispositions are unconscious; why not regard them as *bodily* (not mental) states,—as more or less permanent modifications of brain and nerve,—in a word, as *physiological* dispositions?" Our reply is as follows. If this objection implies that it is convenient for certain purposes to treat them as physiological dispositions,—as "unconscious *cerebration*," to use a phrase which was introduced by Carpenter in his *Mental Physiology*,—then we fully assent. There is no reason to doubt that the formation of psychological dispositions is accompanied by the formation of such physiological modifications; therefore, for convenience and as a matter of method, they may be regarded as if they were physiological dispositions. But to say that, fundamentally and as a matter of real existence, the psychological disposition is really a physiological one, would be materialism; and this is a position which psychology has no right to take up, as long as we understand by the brain what physiology understands by it, namely, a complex of mechanical motions. The very meaning of a "psychological disposition" is to be the source or origin, below the conscious level, of certain modifications which appear in clear consciousness. If, then, the former is simply a "state of the brain,"—*i.e.*, a redistribution of molecular motion in the brain,—then such motion can produce out of itself states of consciousness, which is absurd.

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[1] *Hibbert Journal*, October 1903, pp. 47, 48.

Three important stages in the discussion of the problem of subconscious and unconscious mental processes are marked by the treatment of the topic in Mill, *Examination of Hamilton*, ch. xv.; Ward, article *Psychology*, p. 48; and Stout, *Analytic Psychology*, vol. i., Introduction, pp. 21, 26. Very suggestive is the treatment given by Höffding, *Outlines*, Eng. tr., ch. iii., pp. 71ff. The distinction of "focal" and "marginal" consciousness is illustrated in Lloyd Morgan, *Comparative Psychology*, ch. i.; and good illustrations of subconscious processes are given in Külpe, *Outlines*, pp. 290, 291; cf. pp. 190, 443. A certain amount of confusion is imported into the discussion owing to the ambiguity of the terms "subconscious" and "unconscious." Thus, Lipps, *Grundtatsachen des Seelenlebens*, § ii., appears totally to reject the theory of *subconscious* mental states, while at the same time he argues that *unconscious* processes (*Erregungen*), whose nature we do not fully know, pervade mental life, and that every conscious idea arises out of, and dies away into, such an unconscious process; and Professor James, *Principles*, vol. i. pp. 164-174, criticises the supposition of "unconscious" mental states, while elsewhere (*Varieties of Religious Experience*, 1902, pp. 230-236, 483, 511-513) he speaks with approval of carrying the notion of the "subconscious" to the most extreme lengths (cf. Myers, *Human Personality*). Probably what both writers are really concerned to reject is the supposition referred to above, that the same idea may have both a conscious and an unconscious existence, passing from one to the other without intrinsic change.

CHAPTER IV.

GENERAL CHARACTERISTICS OF MENTAL LIFE, CONTINUED: ACTIVITY, FEELING, THOUGHT.

§ 1. *Learning by experience.*—Are there any other general characteristics of mental life which may be brought under our notice before we turn to study the particular forms of conscious process? The answer is that there are; and we shall arrive at them by considering mind both from the outside and from the inside.

From the outside: students of Comparative Psychology are agreed to take as a true test of the presence of mind in some form, the capacity to learn by experience. The word experience, in its etymological origin, is *experientia*—that is, practical acquaintance, efficiency, and skill, as the result of effort and trial. The child, once burnt, that dreads the fire,—the bird that, having seized in its bill a butterfly of a certain colour, and finding it distasteful, avoids butterflies of that appearance in future,—the dog that recognises the signs of his master "going out," and bounds about in delight in anticipation of a run,—are familiar instances. At higher levels of life we see the same principle at work; as in the case of the child learning to walk, or the man training himself in some new form of skill. In short, a little reflection will convince the reader that experience is always acquired experience; it is the process of becoming expert by experiment (including all kinds of active effort and trial). The whole story of evolution confirms this. Bodily organs become developed where they are needed; but why are they needed? Because life is not passive and motionless, but is ever striking out into new experiments and efforts.

We said that the ability to acquire experience is a true test of the presence of mental life: it does not follow that it is the all-sufficient test—*i.e.*, that when there is no evidence of this capacity (as in the case of the moth that burns itself again and again in the flame until it is destroyed) there is no kind of mental life.

We have now to see that this process of learning by experience is not only a sure sign of mental life, but also suggests some important facts about that life. A mind that can learn by experience must of course be living in, and must adapt its life to, a real outer world or environment. From the point of view of physiology, this means that it is an embodied mental life; only by means of a bodily organism of some kind could it get into connection with its environment at all.[1] Our special question, however, is from the point of view of psychology, and relates to what mental processes are implied in this connection with an environment.

An embodied mind that can learn by experience can *perceive* some at least of its environment; and this present perception must be modified by traces of similar past perceptions and of the special experiences connected with those past perceptions. The meaning of this statement will be made clear by the following illustrations.

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[1] The reader will notice the peculiar position which the bodily organism occupies in this connection. It is (1) *the* indispensable means by which mental life may express itself in, and act and react on, its environment, and (2) *a* part of that environment itself. The body is both these things at the same time.

Let us suppose a moth "seeing" a gas flame for the first time in its life. We must assume it to feel a sensation of brightness which attracts it. Expressed in physiological terms, this attraction is a stimulus which drives it towards the flame. It then feels the germ of what in a fully developed mind would be called a great shock of pain, which instantly drives it away from the flame. Again it feels the attractive sensation. We may assume (for the sake of illustration) that the second sensation is more distinct owing to the previous occurrence of a similar one—*i.e.*, that it is modified by traces of the previous sensation. But so far there is no trace of *experience.* There is only a slightly brighter sensation; and the original performance is repeated with the same result.

What, then, is the *minimum* of conscious process necessary for experience? A bird has several times taken in its bill a butterfly and dropped it, finding it unpleasant. The next time it sees a butterfly of that colour, it does not touch it. We are now on a level of mental life much higher than that of the moth; but there is no reason for assuming anything like developed memory, or even any separate idea or image contrasted with present perception. The several experiences of tasting the nasty insect leave traces behind them; it is necessary, but also sufficient, that these accumulated traces should have strength enough to *tinge with unpleasant feeling* the next perception of that kind of insect—and the insect is not touched. A mature human being might have a similar experience; he would express it by saying, "that *looks* unpleasant," without having, at first, any idea *why*. But he would not stop where the bird stops; he would go on to ask himself why, and try to recall in memory the occasion on which he had actually experienced the unpleasantness. More usually the sight of the object would without effort arouse the idea of the previous unpleasant experience. This is not required to account for the bird's action.

Hence we said that a mind which can learn by experience must be able to have its present perception modified by traces of the special experiences into which similar perceptions entered in the past. We have also seen incidentally that such traces operate at different mental levels: they may be effective in determining present action without involving the presence of a separate idea of the past. In this modification of perception by traces of past experience we have the beginnings of knowledge. The capacity of retaining traces of the past is usually called Retentiveness. It is simply another name for the continuity of mental life, which we have already illustrated when speaking of mental development (ch. ii. § 4), of the general Law of Relativity (ch. iii. § 2), and of Psychical Dispositions (ch. iii. § 5). We say, then, that a mind which can learn by experience must be capable—

(i) of *knowing* its environment to a certain extent,
(ii) of *acting on* its knowledge.

The oldest classification of mental processes adopted this "bipartite" or twofold division into knowing and doing—intellectual and active powers. It corresponds conveniently to the physiological distinction of incoming and outgoing nerve-currents. Only in comparatively recent times was it seen that this distinction, though accurate, is not sufficient.

When action is taken on account of knowledge, we must ask why it is done. It is owing to the knowledge; but when we look more closely we see it is because the mind is *affected* by the knowledge in a certain way,—because it *feels* in a certain way. Knowledge acts through feeling,—it requires the warmth of feeling before leading to action. This is the case even with the highest motives: thus, conscience operates only through the emotion of reverence which it induces for itself; by means of this reverence it enters upon the control of other feelings.

We must therefore distinguish three main varieties of process in mental life: knowing, feeling, willing. The following terms are also in use: for **knowing**, "presentation," "cognition," or "intellection"; for **feeling**, "affective processes"; for **willing**, "activity" or "conation" (Latin *conari*, to endeavour).

The twofold distinction of mental powers into "intellectual" or "cognitive," and "active" or "motive," goes back to Aristotle (d. B.C. 322). In Aristotle's view the main distinction in human nature is between νοῦς (reason or intellect) and ὄρεξις (including sensuous impulse, desire, and will). The medieval philosophers, following Aristotle, adopted a twofold distinction into *intellectus* and *voluntas*. This remained current in Europe until the last quarter of the 18th century. At length the separation of feeling from understanding and will was proposed and defended by a little-known psychologist Tetens (*Ueber die Menschliche Natur*, 1777). This new distinction was adopted by Kant in his great treatise *Kritik der Urtheilskraft*, part of which dealt with the conditions of Æsthetic perception (1790). He also expounded the threefold division in his *Anthropologie* (1798). In English psychology Thomas Reid (*Intellectual Powers*, 1785, *Active Powers*, 1788) gave currency to the bipartite division until the time of Sir William Hamilton (Professor in Edinburgh University, 1836-1866), who was the first to explain and justify, in this country, the importance of the threefold or "tripartite" division (Hamilton, *Lects. on Metaphysics*, xii. and xx.)

§ 2. *Three inseparable factors of mental life.*—The terms "classification" and "division" are commonly, but not accurately, used to indicate the threefold distinction to which we have referred; for this is a distinction of three factors which co-operate throughout the development of mind, and such words as "classification" suggest an arrangement of distinct things according to their likenesses and differences.

We can see how the three elements go together in the process of consciousness. (i) We never experience knowledge in the abstract, so to speak. Knowledge is always some individual's knowledge; and the mere experience of the knowledge as mine gives it a peculiar subjective tinge which we must designate feeling. Further, every cognitive process has at least a minimum of pleasure or pain connected with it; if not in itself specially pleasant or the reverse, then it is so because it is connected with what "interests" us. "Interest" is pleasurable excitement; or if it is the excitement of getting rid of something unpleasant, then it is pleasant in proportion to its success. And along with feeling, the knowing process also involves the conative or active side of the mind, if only in the shape of attention. (ii) In affective processes, however predominant the feeling may be, as in strong emotion or passion, objects must be present involving intellectual elements which demand attention (a form of conation). (iii) Similarly, in the conative process, we become mentally active because some change has taken place in our own ideas or in our perceived surroundings, and the change pleases or displeases us; thus with the active process occurs also the presentative and the affective. (iv) The three factors are mutually implicated also in the development of the mind. We shall see that no real mind could have advanced to the level of *perception* without the help of activity and feeling; the interests which lead to some impressions being attended to and retained, and others forgotten, rest on feeling; and, but for the activity thus prompted, the external world would not be what it is for us. Our experience, as we implied in the previous section, is *made* by us as much as it is *found* or *given;* and our selective interests are what make it.

For these and like reasons the three factors—knowledge, feeling, and conation—have been described as "partial constituents of one concrete whole"—that is, of any actual state of mind; and again, as "different aspects of one and the same process." But though they go together, any one of them may be "predominant"—to use the current expression—in comparison with the others; and this "predominance" of one factor may involve the comparative suppression or obscuration of the others. In some attitudes of mind, "reverie" or "meditation" mainly occupies us, when we seem passively to follow the play of our ideas. Impulse and feeling are really present, but only in slight intensity—*e.g.*, in the form of a disposition to go on thinking about something and so avoid mental vacuity. Reasonings and calculations that proceed without any particular difficulty appear in like manner "passive," when they involve mental activity of small intensity. Exclusive attention to intellectual analysis may starve the emotions, or even in certain ways enfeeble the will:

> "And thus the native hue of resolution
> Is sicklied o'er with the pale cast of thought,
> And enterprises of great pitch and moment
> With this regard their currents turn awry,
> And lose the name of action."
> —*Hamlet*, Act III. sc. i.

On the other hand, emotion disturbs clear thinking. Spinoza inculcated thinking as a means of escaping from the passions: *think* the emotion, he said, analyse it, and you escape from it. Similarly, indulgence in emotion may be inimical to action; the mere "sentimentalist" indulges in grief for the sorrows of mankind, but this leads to nothing practical.

When we say that the three factors can be discerned in "any actual state of mind," there are certain limitations to be understood. These distinctions can only be made when the mind has attained a stage of development above that represented by the most primitive organisms. At the lowest level of mental life, there is no reason to believe that the threefold nature of conscious life can be said to exist. When we look at mind from the inside we find that the nearer we come to any state analogous to the beginning of conscious life, the nearer we come to a state in which there is no capacity for distinguishing objects,—a vague diffused state of consciousness which many writers call one of pure "feeling." This use of the term must be carefully distinguished from the meaning which we have given to it in the previous sections, where it signifies at least the special qualities which we call "pleasantness" and "unpleasantness," either of which may belong to any mental process. But it is impossible to maintain that consciousness at its beginning or at any later stage consists of nothing but varying intensities of pleasure and pain. Whether the beginning of consciousness can be called "feeling," in a wider sense, is only a question of the language which it is most convenient to use. If it is to be called "feeling," we must remember that the feeling includes impulse. There is no known animal organism so undeveloped as to be capable only of "vegetative" functions (of merely assimilating nourishment) and incapable of movement through "irritability." Take, for instance, one of the simplest types of life, the genus *amœba*, species of which exist in most stagnant pools. It consists of nothing but a little mass of semi-fluid protoplasm containing a nucleus. It is capable of spontaneous movement, which consists in changing its shape and extending portions of its substance into arm-like projections, which it again draws into itself. It absorbs and assimilates particles of food, which it dissolves. It multiplies by dividing into two (the nucleus dividing also), when each portion becomes a complete *amœba* like the original one. Now, we are not able to affirm positively that such a creature has any mental life at all; but the point is that if it has, these physiological characteristics suggest that it consists of a series of impulses. At whatever stage of physiological development we assume mental life to begin, we shall find physiological grounds suggesting that such mental life is active or impulsive.

The threefold scheme is very ably explained and defended by Ward, article "Psychology," *Ency. Brit.*, vol. xx. pp. 39-44 (see p. 40 for criticism of the view that consciousness can ever consist only of pleasure and pain). Ward maintains that this analysis is applicable at every stage of mental life, where we always find a subject related in its action-under-feeling to presentations or "psychological objects." It is discussed from the same point of view by Mellone, *Philosophical Criticism and Construction*, ch. iv., who maintains that it breaks down if applied to the beginning of mental life in the order of time on the earth (*op. cit.*, ch. v., pp. 275ff) or to the ultimate ideal of consciousness (ch. vii., pp. 374ff), and that as a matter of present fact it will not work with those pleasures and pains which seem to be directly dependent on physiological stimuli rather than on distinguishable presentations (ch. iv., Appendix, pp. 202, 203, 239ff.) For a discussion of the psychological utility of the threefold scheme, see Bradley, *Mind*, N.S., No. 33, "A Defence of Phenomenalism in Psychology," and Mellone, *Mind*, N.S., No. 39, "The Nature of Self-knowledge."

A modified form of the twofold division was proposed by Brentano : (1) simple apprehension, (2) judgment or belief, (3) interest or desire. Professor G. F. Stout usually lays out the topics of Analytic Psychology according to this scheme, of which he has given a critical examination (*Analytic Psychology*, vol. i., bk. i.) At the same time he has done justice to the older threefold scheme as we have set it forth above (see his *Manual of Psychology*,* bk. i., ch. i.) Other important discussions of the same topic are Sully, *Human Mind*,* vol. i., ch. iv., and vol. ii., App. A; Fouillée, *La Psychologie des Idées-forces*, Introduction; Lotze, *Microcosmus*, vol. i., bk. ii., ch. ii.; Höffding, *Outlines of Psychology*, ch. iv.

Hamilton set the fashion of relying on a merely negative criterion for distinction of the ultimate elements in mind: *i.e.*, that a mental function is "ultimate" when it cannot be derived from any other, or from a common ground with any other. This is true of many constituents of mental life (*e.g.*, sensation and emotion) besides cognition, feeling, and will. When we say that these three are "ultimate," we mean that, apart from certain exceptional or limiting cases, they are the general modes necessary to constitute any concrete mental state; and this is not true of any other constituents of mental life.

We propose to treat the subject according to the threefold scheme, which seems to us the simplest for an elementary work. Whatever scheme we started from, we should have to follow one line at a time in exposition, when the facts run, so to speak, many lines abreast. In the three following sections we shall mark out the point of view from which each of the three mental functions is regarded in this book.

§ 3. *Activity or Conation.*—We have already indicated that the meaning of Will as a psychological term is not limited to the control of muscular movement and outward action, for which the name "volition" is usually employed; but in order to show the general psychological characteristics of Will, we may take the case of a simple volition—*e.g.*, when I lift an object with my hand. When I move my arm to move an object, it is evident that I have first an idea of the end or purpose to be effected. What more is there in the process? At first view it may seem as if—besides this idea, and some slight feeling of exertion in the body generally—there is nothing else but the perception of the movement actually being performed. But when I am psychologically interested in the movement itself, and perform it slowly so as to examine it from the inner side, I find that between the idea of purpose and the perceived movement there is a peculiar impulse. This impulse appears as a real mental experience, differing for different movements, and standing in such close relation to the movement intended, that it seems to be the immediate cause of the latter. Now, the impulse consists partly of feelings of strain in the bodily parts which are specially connected with the muscles engaged in this particular movement. Are these feelings the whole of it? Some theorists maintain that the muscular sensations are the whole of the "impulse," so that it is really not an impulse at all but an elementary memory-image, due to traces left by the past performance of movements similar to this one: and as it now appears in the mind it plays the part of an *anticipatory idea* of the movement which is to be again performed. Thus, in moving the arm—these theorists assert—you have first the idea of the purpose and the anticipatory idea of the movement being performed (*i.e.*, of the attendant sensations), and then you have the perception of the actual performance of the movement; in other words, you have a succession of mental images followed by a perception. And the contention is that this succession of images and perceptions constitutes the whole psychical fact of willing.[1] On the other hand, ordinary psychology, and common-sense, recognise a mental act or resolve as an intrinsic part of the impulse referred to, which therefore does not consist wholly of muscular sensations. We claim that common-sense is here in the right. On the other hand, it is quite true that this mental act is not represented among the succession of images, for we cannot have a mental image of it. Whenever we cannot have such an image of a fact, some theorists deny its existence.

We cannot give any account of mental activity without using the word "tendency": **a conscious process is active when it tends by its intrinsic nature to develop into something else.** The "something else" is the purpose or end. When we say that anything "tends" or "has a tendency," we mean (1) that, in the absence of outside hindrances, it will issue in a certain result, and (2) that it will maintain its own positive nature in and through the result. Thus (to quote from Professors G. F. Stout and J. M. Baldwin) "an acorn may be crushed into a shapeless mass, or it may grow into an oak. But we do not speak of it as having a tendency to be crushed into a shapeless mass, whereas we do naturally regard it as having a tendency to grow into an oak. The reason is that we consider it as maintaining its distinctive acorn nature in becoming an oak, but not in being crushed. The mental fact which we call Conation is a clear instance of tendency in the sense defined. In the process of attaining its end it is 'realised' or 'fulfilled,' instead of being destroyed or suppressed, and it always proceeds to the attainment of its end if, and so far as, other conditions permit."[1]

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[1] For a brilliant exposition of this view, see Professor Münsterberg's *Willenshandlung*.

Our conclusion is, then, that in volition, and as we shall see not only there but in control of our own thoughts and desires, there is:

(1) A specific mental tendency,
(2) An anticipatory image or idea of the end in which the tendency finds its satisfaction.

Of these (1) is the element that gives the special character of activity to the process.

Conation is an abstract term,[2] and therefore cannot be used in the plural. Just as the abstract term *humanity* stands for what is exemplified or typified in particular men, and consists of those qualities on account of which they are called human beings, so *conation* is exemplified in particular acts of Will or mental endeavour in the widest sense (including disposition, interest, want, wish, desire, impulse, attention). And since conation is an abstract term, we cannot do more than give a general indication of what it means;

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[1] Baldwin's *Dictionary* under heading "Tendency."

[2] *Introductory Text-book of Logic*, ch. ii., §§ 2, 3.

but in speaking of particular kinds of conation we are no longer dealing with this abstract characteristic alone, but with the particular kinds of mental endeavour in the concrete. When a conative process finds its satisfaction in *increased clearness and distinctness of modes of knowledge* (*perceptions or ideas*) it is called *attention.*

Conation may be more or less intense: indeed, there is reason to believe that the distinction between active and passive consciousness is only one of degree, not of kind. Common language implies a distinct recognition of this as regards all the varieties of conation mentioned above; thus, *attention* is always a matter of degree, whether in the simple form of attending to a perception or idea, or in concentrating the mind on one group of ideas to the exclusion of others that have presented themselves, or in reasoning out a problem the solution of which is not obvious, or in trying to remember something which will not "of itself" occur to the mind.

Finally, we must emphasise the fact that when we speak of knowledge or intellectual work being engaged in "for its own sake," this does not mean that feeling and conation are absent; it only means that feeling and conation are tending in a special way, and finding their satisfaction in intellectual, scientific, or theoretical aims. It is important to remember that the "disinterested" pursuit of knowledge is a late product of mental development. At first theory only exists for the sake of practice; perception and knowledge are only a means of satisfying practical needs. The "embodied mind" must adapt itself to its environment, or its environment to itself, in order to maintain its existence there; and at first cognition is only a means by which this adaptation is made possible.

Professor G. F. Stout has given a full explanation of the notion of mental activity in *Analytic Psychology*, vol. i., bk. ii., ch. 1. Similar views are expressed under the headings Activity (mental), Conation, End, Impulse, Interest, in Baldwin's *Dictionary*. Professor Ward's view of conation, as identical with attention and co-extensive with mental life, is set forth in article "Psychology," *Ency. Brit.*, vol. xx. pp. 42a-44a. Bradley (*Appearance and Reality*, pp. 96-100, 603-607, 2nd edition; and in *Mind*, N.S., No. 40, "Some Remarks on Conation") criticises the conception of activity as applied to the mind, but in the end appears to accept it with limitations.

Professor Stout's view is that the process of conation is a *felt* or *immediately experienced* mental transition,—felt, whenever it occurs, as more or less intense, more or less effective, more or less free or constrained. The nature and limits of the "feeling" of activity give rise to an intricate and vexed question. We have seen that some—as, for instance, Professor Münsterberg—hold that the only activity which is *experienced* consists of muscular sensations. This is also the traditional view in British Psychology, and was maintained vigorously by Professor Bain. He, however, complicated the question by asserting a "sensation of innervation" as part of our muscular sensibility,—that is, a sensation specially corresponding to the efferent or outgoing nerve-current which innervates the muscle, and so causes the movement. This question cannot be held to be finally settled, but the balance of evidence is against Bain's view, which is entirely rejected, for example, by Professor James (*Principles of Psychology*, vol. i. pp. 296-305), who defends the opinion that our only experience of mental activity is of *afferent* muscular sensations. Afterwards (vol. ii. pp. 559-573) he rejects this explanation of activity, and affirms the reality of a purely mental act.

The question of how the activity-experience arises seems really to mean, how do we come to *know about* mental activity? To this, the only possible answer is, that we come to know about it in the same way in which we come to know about thinking, feeling, sensation, memory, &c.; in other words, we arrive at knowledge about all our distinguishable mental processes in one and the same general way. This being clearly understood, for Psychology there is no need to inquire farther. The possibility of such knowledge must be presupposed, in order that psychology may exist. Most of the difficulties, however, which have been found when the question is pursued farther, have been gratuitously manufactured, and many of them are little more than verbal. It must be granted that there is an "immediate experience" or "feeling" of conation, simply because the relation of the mind to each and all of its particular processes involves an element which can only be described as "immediate (or direct) experience" or "feeling." We could not conceive or think about any mental process whatever without such a basis of immediate experience to account for the conception. The psychical process which is known or reflected on, must have been present in the mind, not as a distinct process, but as immediately felt.

§ 4. *Feeling.*—The verb "feel" and the noun "feeling" have a variety of meanings in common language. Thus we should describe as "feelings" the following kinds of mental fact:—

(1) Pleasure and all kinds of pleasantness, pain and all kinds of unpleasantness;

(2) Organic sensations, such as hunger, fatigue, especially sensations indicating the healthy working (or the reverse) of the body and its various organs;

(3) Emotions, such as anger, fear, surprise, excitement;

(4) Sensations of touch and temperature.

Excluding (4),[1] we must ask whether (1), (2), and (3) have in common any characteristic which we may suppose the term "feeling" to mark. The answer is in the affirmative. As "feelings" all these are psychologically *subjective* processes. What does this mean? It is very simple.

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[1] Which are called feelings only in so far as they partake of the nature of organic sensations.

My ideas and my actions, though I know them as *mine*, have reference specially to the surrounding world; my "feelings," though usually aroused by objects, have reference in a special way to my *self* as distinct from the world and from other selves. My pleasure, pain, happiness, unhappiness, the pleasantness or unpleasantness with which events affect me, my emotional life, all point inwards to that *central source of conscious processes* which I call myself; and in thinking of my "feelings" I am thrown back upon myself in a more intimate way than when I attend to my ideas or actions. There are other processes, which involve this psychologically subjective element, and which common language speaks of as *felt*, though it would hesitate to describe them as *feelings*. Such are—desire, wish, impulse, interest, certainty, belief, doubt. The subjective quality is what common-sense marks by its use of the word *feel*. We do not say we "feel" a perception or a thought, when these are considered by themselves as cognitive processes. It would be a similar misuse of common language to say we "feel" when we mean we "act." But in real life thought and action do not exist apart from a feeling-process (*e.g.*, an interest); if they did, the thought or action would not only be indifferent to us, but we should not accept it as ours at all,—and in fact, it would be inconceivable that such a mind should "act" in any way.

We use "feeling," then, as an abstract term, to stand for the subjective quality which is exemplified in every real mental process. In this sense the word (like "conation") has no plural. If we speak of "a feeling" or of "feelings," we are referring not to the abstract subjective element by itself, but to the particular mental processes so named in ordinary language.

We require another term, however, besides "feeling." The subjective quality of mental facts shows itself or manifests itself in a special way. The mental fact, in virtue of its relation to myself, is generally *pleasurable or painful* in some degree. Whenever we feel an organic sensation, an emotion, a desire, a wish, an impulse, an interest, a belief, a doubt, our feeling of it may rise towards pleasure or what is definitely agreeable, or fall towards pain or what is definitely disagreeable. Whenever, then, we abstract these qualities, pleasantness and unpleasantness, or consider them by themselves, we need an abstract term to stand for their varying degrees, just as "temperature" stands for the varying degrees of heat and cold. Ward and others use "feeling" as an abstract term, in the singular, for this purpose, and strictly limit it to this meaning. But it would seem that the subjective quality of mental processes does not consist only of pleasure and pain; and as we need the term "feeling" in other meanings, such a limitation is in any case very inconvenient. It cannot be said that a satisfactory term has been found. We shall use the term "affection," with the corresponding adjective "affective." This is open to the objection that the word is used in common language in a much more limited sense. But it must be distinctly understood that this limitation is absent, and that "affection" in psychology stands simply for pleasantness or unpleasantness, by whatever conditions aroused. It is an abstract term, like feeling and conation, and is to be used only in the singular. It is applicable to every mental process in its feeling-aspect (that is, in its relation to the central unity of mental life); just as "brightness" and "darkness" are applicable to the various colours of objects. When used in the plural, the term "affection" signifies not the abstract quality of pleasantness or unpleasantness, but the actual states of mind in which it is experienced. The terms "pleasure" and "pain" are in common use in psychology in the wide sense of "pleasantness" and "unpleasantness" as indicated above.

Professor Sidgwick and Mr H. Spencer have proposed to "define" pleasure or pain by reference to the fact that a pleasurable process of consciousness is one which we endeavour to retain,—a painful process, one which we endeavour to expel from consciousness, or from which we turn to other processes. This is true *in general;* but it is scarcely a "definition," it is rather a statement of the connection between affection and conation. We find that usually our mental activity is first prompted by affective processes, and sustained in response to movements of such processes. Hence arises its selective character—following one line in preference to another; and usually conation has an influence on affection, not directly but by influencing the presentations whose pleasantness or unpleasantness is felt.

A few remarks must be added on terminology. Our account of feeling, as an abstract term, seems to agree with the definition given in Baldwin's *Dictionary*, under heading "Feeling": "Consciousness as experiencing modifications abstracted (a) from the determination of objects, and (b) from the determination of actions." The *Dictionary* proposes the term "affection" for pleasantness or unpleasantness in the abstract. The compound term "pleasure-pain" has also been proposed. Professor Stout prefers to use the term "feeling-tone."

There seems no doubt that, corresponding to the verb "affect," the noun "affection" is the right term, but it has to be divested from the associations clinging to it from its more limited use in ordinary language. Professor William James, in his *Principles of Psychology*, uses the term "feeling" for *any* state of consciousness, including "thought." This is erratic, and in the hands of a less able writer would produce boundless confusion.

§ 5. *Knowing.*—Knowing, like feeling and conation, is a unique process, and therefore we can give no positive definition of it; we can only (so to speak) point to the process in operation.

We distinguished (in ch. i. § 1) between a mental process and the object with which the process is concerned. We are now in a position to consider the notion of object which we there made use of. We distinguished between knowing and that which is known, desiring and that which is desired, attending and that which is attended to, willing and that which is willed, pleasure or pain and that which pleases or pains, and so forth. In each case we have a psychological process and its object. Now, in speaking of these psychological processes we used psychological terms in their popular sense, where they mean actual states of mind each as a concrete whole, so that each involves conation, feeling, *and knowing or thinking*. We have italicised the last phrase, because only so far as the mind is able to know or think are we justified in speaking of an "object" at all. In order to get at the "object" I must ask, What do I desire? What am I thinking about? What do I will? What am I pleased with? And I am able to answer such questions just so far as I am able to know; and so far as I do not know, there is no object present to me. Objects exist for us only so far as we know them. True, knowing never takes place without some interest in the object, but we cannot be interested in anything without having some knowledge of it, however vague and rudimentary.

We must point out again that objects are of many different kinds. I may be thinking about a material object, as the table,—something imaginary, as the "unicorn,"—something ideal, as the immortality of the soul, or duty,—something scientific, as a geometrical figure, or a psychological topic,—or something practical, as the advice I am to give on a matter about which I am consulted: all these are *objects* if and so far as any one thinks of them. The object has characteristics of its own which do not belong to the process in which it is thought or known. It is this process that the psychology of knowledge is interested in, and in the object only so far as it throws light on the process. The processes in which we think of objects or come to know them are called *presentations*.

This term is used in a wide sense. Professor Ward speaks of presentations as "objects"; this is a special psychological use of the term "object," but it may easily become misleading, for in the ordinary sense of the word objects are *presented*, but are not *presentations*. This process of *being presented* is what the psychology of cognition is interested in.

The only exception to the remark just made arises from the peculiar position which sensations hold from the psychological point of view. A sensation, as distinguished from other modes of knowledge, may be described as the simplest possible kind of perception,—the consciousness of a comparatively simple quality, as "red" or "hot." The psychologist is not only concerned with the process by which such qualities come to be presented as objects; he is also concerned with their own independent being and nature. This has been well put by Professor Stout: "Hence the psychologist carefully distinguishes their varieties, classifies them, investigates their qualitative affinities and relations, and inquires into the conditions of their production. If he investigated spatial relations in this way, he would cease to be a psychologist and become a geometrician. But all that can be known about sensations it is the business of the psychologist to know."[1]

§ 6. *Different "levels" of mental development.*—We shall proceed to deal with the three main aspects of mental life spoken of in this chapter, taking first the active element, then feeling, then cognition. It must be clearly understood that none of these three functions could *develop* without the others: thus the element of activity could not unfold itself without the concurrent development of feeling and cognition; feeling could not develop without activity and cognition, nor cognition without activity and feeling (cf. § 2, above).

The student will find his conception of mental development greatly assisted by thinking of mental processes as forming a *hierarchical* system, in which different *levels* can be distinguished.[2] A process at a higher level in a manner controls and unifies processes at a lower level, although the latter may exist and exercise their functions before the former has developed.

A convenient illustration of this fact may be found in the different levels of cognitive function.[3] Cognition begins with the acquisition of knowledge by means of the senses, when what we call a "real thing" or "real object" is present to the senses and stimulates an afferent sensory nerve. The mental process which immediately follows in this nerve-process is a *sensation*, and is typified in the experience of comparatively simple qualities such as "blue," "hot," "sweet," &c. (ch. xi.) Comparative psychology shows that animals may have the capacity of experiencing (and acting on) sensations without being able to unite them in the perception of an object having different qualities,—a "thing" (ch. xii.) The perception of objects, as real things, is a process at a higher level. When the level of perception is attained, the next step is the development of memory or "reproductive imagination," consisting of memory-images or "free ideas" of past perceptions (ch. xiii.) Only "perceptions of things" give rise to these memory-images; there are no distinct memory-images of isolated sensations. The next level shows two branches: (*a*) "productive imagination," or imagination in the ordinary sense, where we make new combinations of mental imagery, representing objects that have never come before our perceptual experience (ch. xiv.); (*b*) "conception," or *thought* proper, of which the distinctive mark is the formation and use of the two primary and fundamental "parts of speech," the *noun* and the *verb* (ch. xv.)

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[1] Baldwin's *Dictionary*, under heading Psychology (vol. ii. p. 384a).

[2] In addition to being psychologically suggestive, this idea has sound physiological foundations.

[3] We may say in passing that when "knowledge" or "cognition" is referred to in psychology, the reference (unless the contrary is stated) is to knowledge of objects other than processes of the individual's own mental life.

The reader will see that the conception of mental levels is equally applicable in the case of activity and of feeling.

CHAPTER V.

MIND AND BRAIN.

Every thinker who seeks to make his thoughts of the universe clear and self-consistent is sooner or later driven to inquire: What is the relation between my mind—the living principle which I regard as my inmost self—and this body of mine which seems now my servant, now my master?

A moment's thought will show that the question involves grave issues. To us, indeed, it is the most fundamental and vitally interesting of all questions, because of its bearing on our views of human freedom and human immortality. And although we have no wish to awaken the controversies which have raged on these age-long battlefields, yet the interdependence of mind and brain, which no one now denies, and which physiological science is every day rendering more and more definite, makes it imperative for psychology to have some clear conception of the nature of the problem and of the solution which would appear satisfactory from her point of view.

The goal here indicated has not yet been reached, for rival theories still hold the field. Accordingly all we can attempt to do is to show the form in which the problem presents itself at the present time, and to expound as clearly as we can what may be called the living hypotheses of the day.

§ 1. *The scientific conception of "matter" and "energy."*—Our first crude thought starts with mind and body as two entities closely connected with one another but differing in essence, the one being, as we say, spiritual, the other material,—the one in some sense untrammelled by the laws of space and time, the other strictly conditioned by them. The one is a unity—at this stage of thought an indivisible unity,—the other is a complex whole made up of parts. The supposition that mind acts on matter and matter on mind presents no difficulty; it is indeed an obvious fact: at the command of the will the limbs move; when the body is healthy and satisfied the mind is content; when it is starved the spirits droop. These two partners, both equally real, make up the self, but the dominant one is the mind: if pressed, we should without hesitation declare, The mind, not the body, is my true self. Pleasure is even taken in emphasising the superiority and independence of the mind compared with the body:—

> "The mind is its own place, and in itself
> Can make a heaven of hell, a hell of heaven."

Still, for obvious reasons, it is the body which thrusts itself mainly on our attention. It appeals to all our senses; it can be examined with comparative ease; most important of all, nature insists that we shall guide it aright or perish. Moreover, it is part of the great space-included world around us, so familiar, so interesting to us all. Here is a permanent order of things in whose stability our thought rests secure: these hills, these trees, these streams, the same yesterday, to-day, and for ever. Shall we not seek to know their nature and their relations to us and to each other? But when we come to look more closely, the permanence we thought to find is seen to be not in changelessness, but in change. Years come, years go, and nothing remains the same. The eternal hills themselves are worn down to plain and valley.

> "The hills are shadows, and they flow
> From form to form, and nothing stands;
> They melt like mists, the solid lands,
> Like clouds, they shape themselves and go."

Yet in the very midst of this ceaseless flux is to be found the order, the stability which our minds demand. For in the change is no caprice; what happens to-day will, if the same circumstances arise, happen to-morrow. Our task, then, is to discover the rules in accordance with which changes take place; and from this endeavour spring the great generalisations of science. To explain the incoherencies of the world of sense, there has been built up and fitted to it point by point a vast unseen framework which introduces law into the chaos and enables us to predict the future.

It would be interesting to follow the formation of this ideal construction step by step, but that would be to give the whole history of physical science. We must content ourselves with asking, Under what aspect does the universe appear when analysis has done its utmost? Until quite recently the answer would have been as follows. The material world is built up out of sixty or seventy elementary or simple substances, which are themselves changeless in their properties and indestructible; these elements, alone and by "combining" one with another, make up the various substances we know; but no matter how much they appear to be changed by the associations into which they enter, they can always be recovered and made to show their own original properties. Of late years we have been able to press farther into the intimate nature of matter, and this advance has been the source of the most profound satisfaction to the philosophic mind. For the deepest craving of our intellect is for unity, and to many of us the sixty or seventy elements accepted by chemists were, so to speak, a pinching shoe which made the mind go halt. Now, thanks to the discovery of radio-activity, nature has yielded to our demands, and in "corpuscles" —defined as units of negative electricity—we seem to have found the primal stuff of which our world is built.

Along with the conception of the indestructibility of these elements of matter must be set what is perhaps the most fruitful scientific generalisation of the century which has just passed away—that of the conservation of energy. This law asserts that the quantity of energy available in the universe is constant,—can neither be increased nor diminished. Energy passes from one form to another, passes from electricity to heat, and from chemical attraction to electricity, but in all its changes undergoes neither increase nor diminution.

The direction in which these conceptions point is now obvious. In a lecture delivered at Innsbruck in 1869 by Helmholtz, occurs the following pregnant sentence: "If, then, all elementary substances are unchangeable in respect to their properties, and only changeable as regards their combination and states of aggregation—that is, in respect to their distribution in space,—it follows that all changes in the world are changes in the local distribution of elementary matter, and are eventually brought about through Motion."

We are possibly still far from understanding exactly how each form of energy may be reduced to motion, but the method does not at all affect the result. The world, according to the physicist, consists of matter (or electricity, or perhaps ultimately the ether—in this connection the word is of no importance) in constant motion; and motion, be it observed, is essentially a change determined from behind—*i.e.*, determined by some other change preceding it in time. In this conception lies the whole *rationale* of Physics: her business is to find out according to what invariable rule of succession does *this* follow upon *that*.

§ 2. *Application of these principles to the brain.*—Such, then, being our conception of the world of touch and sight, we turn to inquire how it affects the one piece of matter in which as psychologists we are interested—namely, the human brain. It was long before man could make up his mind to treat man as in any sense a machine. Even so late as the middle of last century it was often maintained that even auscultation and percussion of the organs of the chest were coarse mechanical means of investigation unnecessary to a physician with clear mental insight, and that it debased a human being to treat him like a machine. Philosophers, however, were not so slow to feel the attractions of the mechanical theory as a mode of reducing the universe to unity; and even in the seventeenth century great thinkers were found who seriously maintained that for the animal creation desire and fear, hate and love, do not exist; that their cries may be regarded as the mere creaking of a wheel; that, in a word, all their actions may be explained as we explain the action of a steam-engine. Even in the case of man the interference of mind with the bodily machine was minimised as much as possible; and here accordingly we find the delightfully quaint notion that in the *pineal gland*,[1] and there alone, soul and body meet.

In our own day the mechanical theory has come to be applied boldly to the human body with the most remarkable and satisfactory results. A definite part of the *cerebrum* of the brain (the *cortex*[1]) is now recognised as more particularly the seat of mind. On the study of the human brain all the resources of science have been brought to bear, with the result that, in the words of one of its most distinguished exponents, it has been shown to be "delicate and complicated beyond our present comprehension." It has been computed that there are in the grey matter of the brain about three thousand millions of cells, and "each of these cells is an active organ of most complicated internal arrangements, so far independent in action, and each has attached to it as part of it 'dendrites' and means of connection with other cells and with the organs of the body." The brain is, as it were, the central office of the body. It regulates its whole nutrition, is the vehicle of sensation, the originator of movement, the instrument of thought. A mind deranged has been proved to indicate brain injury; and most striking fact of all, many of the mental functions have been localised in definite parts of the brain. Areas of the brain concerned with the movements of the arm, the leg, the head, the trunk, have been mapped out. Four sense-centres appropriated respectively to sight, touch, smell, and hearing have been distinguished; between these, and possessed of a peculiar and elaborate nerve structure, are situated the four great thought-centres, or centres of association.[2]

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[1] See Glossary of Physiological terms at end of book.

§ 3. *Localisation of brain-function: examples.*—As an example of the kind of work which is being done in this localisation of the functions of the brain, let us examine the evidence accumulated by the study of the symptoms embraced under the term Aphasia.[1]

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[1] See Glossary of Physiological terms at end of book.

[2] Cf. Flechsig, *Gehirn und Seele* (the passages are referred to also in Professor James's booklet, *Human Immortality*, pp. 20, 21, 89-91).

To understand the different forms of Aphasia, a general knowledge of the working of the nervous system is required. The nerves which connect the periphery of the body with the central nervous system (spinal cord and brain) are divided according to their functions into two kinds—sensory and motor. The sensory or afferent nerves transmit stimuli from the various end organs of sense—the eye, the ear, &c.—to the brain; the motor or efferent nerves convey mandates from the brain to the muscles. Corresponding to this distinction in the nerve fibres, there are in the brain sensory centres and motor centres which respectively receive and project the stimuli which pass along the nerves. The centres are themselves connected, both directly and through "higher" or thought-centres. Persons suffering from Aphasia may be affected in any of the four following ways: 1. They may fail to recognise spoken words as words, though they hear the sound perfectly well. This is word-deafness or Auditory Aphasia. 2. They may fail to recognise written characters as words, though they see them as black marks on white paper. This is word-blindness or Visual Aphasia. These two forms, which both affect messages conveyed by the sensory nerves, are grouped together as Sensory or Receptive Aphasia. 3. Patients may be unable to use words correctly, though they have no difficulty in making the sounds. This is Vocal Aphasia. 4. They may become unable to write words, though they remain able to speak them. This is Graphic Aphasia or Agraphia. These two latter forms, which affect the work of the motor nerves, are grouped together as Motor Aphasia.

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[1] "Lectures on Aphasia," by Byrom Bramwell, M.D., F.R.C.P.E., F.R.S.—*The Lancet*, Jan. 13, 1906.

Now each of these forms of Aphasia has been found to be accompanied by, or to be the symptom of, an injury to a definite portion of the brain. Accordingly, in correspondence with the four kinds of Aphasia mentioned above, we distinguish in the brain an Auditory Speech Centre, a Visual Speech Centre, a Vocal Speech Centre, and a Graphic Speech Centre. These speech centres normally occur in the left hemisphere of the brain, and their positions are shown in the diagram (fig. 1).

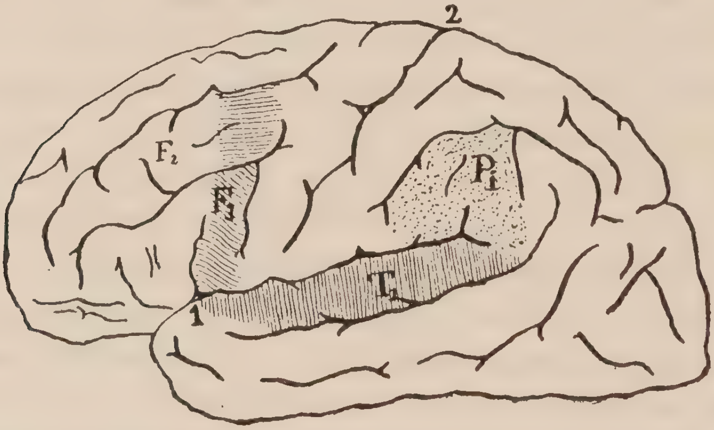

Fig. 1.—Outline of the Left Hemisphere of the Brain.

1. Fissure of Sylvius. 2. Fissure of Rolando. F_2, second frontal convolution; the shaded area shows the position of the graphic speech centre. F_3, third frontal convolution; the shaded area shows the position of the motor-vocal speech centre. T_1, first temporal convolution; the shaded area shows the position of the auditory speech centre. P_i, inferior parietal lobule; the shaded area shows the position of the visual speech centre. (Figure after Bernard, from Dr Byrom Bramwell's lecture on "Aphasia," *The Lancet*, Jan. 13, 1906.)

Of these speech centres the auditory and the vocal are the primary pair; the other two may, and sometimes do, remain uneducated through life: it is, moreover, probable that through the auditory speech centre alone Intelligence and Will can be aroused—that is, the visual speech centre acts through it,—and through it the motor speech centres are called into action. Of the auditory speech centre the functions are: "1, to receive, and 2, to register the sound vibrations which constitute spoken words; and 3, to bring the cell and fibre groups in which auditory speech symbols are received, and in which the memory pictures of these auditory speech symbols are registered and stored, into connection with the corresponding or associated cell groups in other parts of the cerebral cortex, in which the ideas or memory pictures of the objects and other percepts to which those auditory speech symbols correspond are received, registered, and stored." The function of the vocal speech centre is "to produce the highly intricate co-ordinate muscular movements which are necessary for the production of the sound vibrations, or rather series of combinations of sound vibrations, which constitute spoken words."

It is important to note that the auditory speech centre is not supposed to store the ideas[1] which correspond to the objects represented by the words, but merely the images of the words,—that is, before we can *understand* the words other and higher centres must become active.

The study of Aphasia is of interest to the psychologist for several reasons.

1. Total Aphasia is observed to have an extraordinarily deteriorating effect upon the power of thought: in the words

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[1] In scientific accuracy, of course, the brain does not store *ideas* or *images*, which are states of *consciousness;* it preserves traces left by past brain-changes *corresponding* to these states of consciousness; but for shortness the looser form of expression may be used.

of Dr Byrom Bramwell, "in the absence of internal speech it is difficult or impossible, so far as our knowledge and information enable us to judge, to carry on any but the most elementary intellectual operations. . . . The mental condition of such patients resembles in some degree that of the lower animals." This dependence of thought on speech is the more noteworthy in that the speech centres are admittedly not ideational centres.

2. It is possible, though not certain, that the differentiation of the speech functions thus demonstrated by the structure of the brain may contain important indications for analytic or genetic psychology. Notably the supremacy of the auditory speech centre would seem to have an important bearing on educational methods. If this possibility be generalised, then all progress in the localisation of brain functions becomes of interest, as it may tend to confirm distinctions made in the mental functions, or may even throw light on the development of the mind.

3. The very localisation of mental functions in definite parts of the brain tends to impress upon us the dependence of mind upon brain. The evidence of comparative anatomy, the action of drugs, such as chloroform, the facts of insanity have all been adduced as pointing in the same direction. To some biologists, indeed, the matter no longer admits of dispute : thus Haeckel goes so far as to class psychology as a branch of physiology.

But before we commit ourselves to any such theorising, it is important that we should be absolutely clear as to how much has really been done, and what are the issues involved.

Perhaps the most important aspect of the work of physiology is this—that she has rendered inconceivable the old notion of a mind sitting apart to receive messages from the outside world, deliberating upon them, and then launching into the material world of brain and muscle the fiat of the will. To the physiologist mind and brain are inseparable—that is, every thought, every desire, every emotion is accompanied by brain action : there can be, so far as his knowledge goes, no mental life at all apart from the building up and breaking down of the cells which constitute the brain. Nor are the laws which regulate the constant interchange of material in the brain cells considered different in kind from the laws derived from a study of the less complex forms of matter. There is a science of organic as well as of inorganic chemistry, and the possibility of science means simply the possibility of detecting unchanging principles running like guiding threads through the manifold confusion of life. Indeed the barrier betwixt organic and inorganic is wearing thin, and any day may bring the news that it has been broken through, and that a living organism has been produced in the laboratory. The human brain, then, is simply one little knot, one little aggregate of atoms in the great material universe; and as such it is swept into the system of matter and motion to which, as we saw on p. 77, physics has reduced the world. Any momentary brain condition results inevitably from the condition immediately preceding, and as inevitably determines the one which immediately succeeds.

So far good. We have now a self-consistent and clear representation of our universe. We have fitted everything into its place in the general scheme, and it only remains for science to work out the details by the same means which have already brought her so near her goal.

§ 4. *Where does consciousness come in?*—But there is in all this one aspect of experience which we have ignored. Where in this scheme is there any place for consciousness? To an outside spectator, if such could be imagined, we might seem to have given an all-embracing account of our system, but to ourselves, who know at least part of it from the inside, the interpretation is hopelessly inadequate. And to realise its inadequacy thoroughly, we have simply to develop its meaning so far as it affects consciousness.

On this view consciousness would come into being whenever molecular motion attained a certain degree of complexity, as it does in the cortex of the brain. But the whole physical series being absolutely determined in its course, consciousness has no power whatever to change the course of events: it becomes a mere "epiphenomenon," a spark thrown out as the wheels clash on the rails. What we call the freedom of the will becomes "a pure dogma, based on an illusion, and has no real existence." The train of thought which results in "In Memoriam," the heroism of a Grace Darling, the philanthropy of a Howard, can all be expressed in terms of a mere mechanical sequence. The same interpretation must be carried into all our most ordinary actions. When we put up an umbrella to shield ourselves from the rays of the sun, our feeling has nothing to do with our action. The course of events is as follows: molecular motion is aroused in the sensory nerves by means of the vibratory heat waves; it is propagated along the nerves to the brain, where molecular disturbance ensues, resulting in a discharge by means of the motor nerves into certain muscles which, by contracting, raise the umbrella. Molecular motion all along the line, motion determined by what has gone before. Thus the self-assertion of matter, combined with the self-forgetfulness of mind, has resulted in the banishment of mind from any real connection with the universe—a strange paradox, truly, especially when it is remembered that these arrogant molecules (so far as they are within our knowledge or even the knowledge of the materialists) are in their origin an ideal construction built up by the mind.

That this representation of the universe is, however, a possible one, is shown by the fact that it is accepted by some thinkers. To most of us it is inadmissible for the following reasons :—

1. The mechanical theory would render impossible any belief in such a thing as duty or right and wrong. In a mechanically-ordered universe these terms have simply no meaning. It appears to the writers that the existence of a universe in which evolution is going on, and leading up only to more and more complex mechanism, would be simply silly. This objection we cannot, however, press in the present work; it would fall rather to be considered with the metaphysical aspects of ethics.

2. To us the essence of consciousness appears to lie in the fact that it is purposive: we believe that we have the power of dwelling on some motives and excluding others, and so selecting our own course of action. Our conduct is self-determined. This belief is set down by the mechanicians as an illusion. But why such an illusion should have arisen is unintelligible.

3. It is contrary to the principles of biological science to suppose that any function or power should arise unless there is a demand for it, unless it is of use. On the mechanical hypothesis consciousness is of no use whatever, and it is difficult to see why it should have arisen as the concomitant of molecular motion of a certain degree of complexity, when we have been assured that this very complexity has arisen without its aid, and will pursue its course regardless of its presence. To say it is involved in the very nature of the motion is simply to take refuge in final inexplicability, or to suggest that this molecular motion is other than we have been led to believe.

4. It is, after all, consciousness which is the fundamental fact of experience. Every thinker who, like Descartes in his famous *Meditations*, seeks to go to the root of his beliefs, is driven down to this as the one basal certainty. Thus Tennyson in "The Ancient Sage":—

> "Thou canst not prove the Nameless, O my son,
> Nor canst thou prove the world thou movest in,
> . . . .
> Thou canst not prove thou art immortal, no
> Nor yet that thou art mortal—nay, my son,
> Thou canst not prove that I, who speak with thee,
> Am not thyself in converse with thyself. . . ."

If we analyse any most ordinary little item of experience we see the truth of this contention, that consciousness is our most fundamental fact. When we are sitting in front of a fire what do we find?—that we have a sensation we call heat, and also various sensations of colour. All else that we *know* about the fire is made up of our memories of past experience with other fires, and, it may be, of the interpretations which have been put forward by physics and chemistry to explain or render coherent and self-consistent certain sense experiences. Our most ingrained beliefs—that other minds like our own, and also that a permanent order of things in some sense independent of us, do actually exist—may be shown to be ultimately scientific hypotheses formed to account in the most intelligible and satisfactory way for the facts of experience.

It may be replied that if we accept the existence of other minds, and of a permanent order of things, we cannot stop there; if we step beyond the existence of our own single minds at all, we are bound to accept the whole construction of science, for each step follows necessarily on what precedes: at no point can we logically say thus far and no farther. In a sense this is true. It is only when the mechanical interpretation of the world is put forth as an intelligible explanation of the facts of our experience that we have any quarrel with it. To consciousness nothing can be so intelligible as consciousness, and to talk of explaining mind in terms of mechanical motion is simply an absurdity. It might seem needless to insist on what one might suppose would be self-evident to all; but the magic network which science has woven in the present generation has so ensnared many of our ablest minds, that to them a molecule appears more intelligible—more fundamental—than a thought; a chemical equation than a feeling; a release of atomic energy than a volition.

This is simply a striking instance of the remarkable power which our dominant interest has of colouring our mind. At Windsor, in a conversation with the late Queen, a visitor once referred to "the copper horse at the end of the long avenue." "That is not a copper horse," said her Majesty with surprise, "that is my grandfather." In the same way, to theorists on cerebral molecular motion, we reply, That is not molecular motion, it is my thinking.

§ 6. *Consciousness the fundamental reality.*—Having for these reasons been led to reject the mechanical theory which would reduce man to a "cunning cast in clay," as inadequate to the facts of our experience, we must consider whether the other hypotheses which have been been put forward are any more tenable.

The hypothesis which we have just dismissed, laid stress on the material side of things. But since the more fundamental reality, as we have just shown, is to be found in the world of mind, we naturally ask, Would it be possible to construct a consistent explanation of the universe in terms of consciousness? In this case our mental life would, so far as we are concerned, express the inmost nature of reality; the activity of the brain cells—in the last resort the molecular motion in the brain—would be simply the mode in which consciousness manifests itself to our senses, or would manifest itself were it possible for us to see or touch a brain in action. Such a construction would, at all events, seem to lay the emphasis in the proper place. Again, since the human brain is actually part of the world of nature, it would seem to follow that all nature must be regarded as, in its inmost self, life of some elementary kind—as in its essence spiritual. The whole world of nature and course of evolution would be interpreted as life striving towards self-realisation, and culminating in the mind of man. In the case of most of the material world we naturally represent to ourselves the changes which take place in terms of matter and motion, because that is the mode in which they are presented to our senses; but, in the case of our conscious life, we just as naturally regard the changes as changes in thought, feeling, desire, because we know that is what they really are. That they have another aspect—that of brain action—is of no importance except to science, which is in the main concerned only with the world of the senses, or world of description as it has been called.

This theory with respect to the world of science involves a complete inversion of our usual point of view; hence we have at first considerable difficulty in even grasping its import, much more in accepting it. But even apart from this psychological stumbling-block, its path is by no means clear before it. The difficulty that now besets it is a serious one, but one that has to be faced by every theory except the purely mechanical.

This difficulty, brought to its sharpest focus, is this: What is the relation of the hypothesis now under consideration to the scientific conception of the human brain? For we cannot simply ignore the contention of science that all mental changes can be represented under a mechanical aspect. If it be possible for any series to present itself continuously under a mechanical aspect, then it must itself be in its nature mechanical, and in no sense self-determinative; and in this case of what importance is it whether we regard it as material or spiritual in its essence? In either case, all our highest beliefs and aspirations must be dismissed as illusions. If, on the other hand, the purposive interpretation of the world is to hold, if man is in any real sense of the word an *agent*, then the general truths discovered by science, and known to her as laws of nature, cannot hold throughout the whole of nature.

§ 7. *Possibility of reconciliation.*—If, then, we accept the purposive theory of the world, the theory which allows man to be an agent, at what exact point must we diverge from the mechanical theory, and how can this divergence be shown to be compatible with the work which has been actually achieved by science?

Now, in the first place, no one will deny that a large part of our mental life may be regarded as mechanical, —our ideas come in trains, one state of consciousness arises out of the preceding, our volitions are determined by motives. One can easily conceive that many such successions of thought might fairly appear under the aspect of brain changes determined by physiological and chemical laws. On the mental side this fact is represented by the consolidation of character. Again, many of the phenomena of insanity — such as fixed delusions — show that the mind has a tendency to degenerate into mechanical action. Even in the conversation of people of a low intellectual type this tendency may be seen in the way their stream of talk flows on under the influence of one dominant idea or directed by passing distractions, without showing any real mental grasp or guidance. Indeed most of us can carry on a fairly rational conversation about ordinary matters on very mechanical lines while our real minds are busy about other business.

But when all is said, there comes a point at which we must draw the line. Man's life is not ruled by mechanical laws throughout. He is, it is true, conditioned by what we may call the mechanism of the mind, and must work in accordance with its laws. Thus he seeks forgotten knowledge by aid of the principles of association of ideas, he initiates connected trains of thought, and so seeks to bring into consciousness the idea he wants; he guides his will by motives, laying stress on one to the exclusion of another. Now at such initial points the course of mental change is not mechanical, determined from behind; it is purposive, determined by ends or ideals. And if we admit this, it is perfectly clear that the physical changes in the brain, which are the concomitants of these mental changes, cannot be in absolute conformity with mechanical laws. We cannot, of course, prove that in any such cases we really are agents in the sense of being able to direct our own course, for to do so we should have to turn back the wheels of the universe, and, standing again at the parting of the ways, do that which on the previous occasion we did not do. That we can dwell on higher motives to the exclusion of the lower, that we can in a word build up our own character, is in the main a matter for "belief." But as we have shown, any other view is so unintelligible that we should decline to accept it in the face of almost any so-called proof.

Now, as matters stand at present in the scientific world, there is no such proof. We have spoken above of the "contention of science that all mental changes can be represented under a mechanical aspect"—in other words, that brain action takes place exclusively in accordance with physical and chemical laws. But this is in reality not so much a contention as a pushing of scientific hypotheses to their logical conclusion in domains where they have never been verified by experiment. In the main this has been done by men who have never clearly realised that the scientific attitude involves any presuppositions at all. Many men of science who do realise this expressly guard themselves against such conclusions by stating that science does not pretend to offer explanations, if by explanations be meant ultimate explanations. It is clear that only in the light of the hypothesis that the ordinary physical laws do hold in the brain can physiology hope to make any progress in her study of that organ. In this study during the last fifty years she has done a marvellous work which stands as an enduring testimony to the perseverance and ingenuity of man. And there is still a large hardly touched field before her where, as we have shown above, it is probable, from what we know of the mental aspect of things, that mechanical laws do in the main hold. But when she comes — if she ever does come — to investigate what action takes place in the higher centres when the processes of choice are going on, then her hypothesis will fail her.

But it will be said, It is not in view of the advances made by physiology in the region of brain research but in the light of more general considerations that it is thought that the mechanical view must be true of the world as a whole. The great law of the conservation of energy demonstrates conclusively that no action not predetermined can take place. Here we must remind ourselves that the law of conservation, like the other laws of science, is merely a generalisation : it must not be transformed into a fetish and held to be necessarily true in regions where it has not been tested. The complexity of the processes of life is such that it has not yet been proved true with regard to man. We grant, however, that various considerations render it not unlikely to be true that man in the long-run gives back in other forms all the energy which, in the shape of food, &c., he has received from the general store. But even if this be true, nothing is said about the *direction* of this energy which man appears able to turn to his own uses ; the law refers to quantity only.

So long as the quantity of energy going in and the quantity of energy given out are equivalent, then the law is fulfilled. Hence we maintain that the supposition that the transformations of energy taking place in the brain can be guided now in this direction, now in that, does not conflict with the theory of conservation. If it be true, then, as we are at present surmising, that brain change is merely a symbol of mental change, and if it be true also that man's life is in essence purposive, then it follows that the processes of choice would be represented in the material world by changes in the cerebrum which would appear as self-directed transformations of energy—that is, changes which could not be predicted by any natural law.

§ 8. *Only two alternatives possible.*—There are only two alternatives open to us here—either life is mechanical or it is not. If it is not, it cannot possibly be presented entirely, as physiology for her own purposes quite legitimately assumes, under the form of a series of mechanical changes. We think the hypothesis that there is at certain points in the universe a breach of the laws of motion—for, as we have seen, all forms of energy may ultimately be reduced to motion—leads to fewer difficulties than the hypothesis that mechanical laws hold throughout. But in the nature of things this negative hypothesis which we adopt can only be proved true by the failure to establish the opposite. And in the present state of science we certainly cannot yet fairly claim that this failure has taken place, for we are, as has been pointed out, merely at the beginning of the scientific study of the brain.

Meanwhile both physiology and psychology are justified in making use of whichever hypothesis suits them best, but we ought frankly to recognise that the time is not yet ripe for a final decision between them *on scientific grounds.* Science ceases to be science when it becomes dogmatic and seeks to enforce a premature generalisation.

With respect to the particular point in dispute between the determinists (who believe that life is nothing but mechanism) and the self-determinists (who believe that man is a self-directed agent in the course of events), there are, we have maintained, only two alternatives, and every theory of the connection between mind and brain has to choose between them.

But the two theories as to this connection with which we have dealt do not exhaust the possibilities. There are at least two others which take rank as living hypotheses; and to these we must now turn.

§ 9. *The theory of Parallelism.*—The third theory is that of Psycho-physical Parallelism or the Double Aspect Theory. According to this theory there are two series of events—the one psychical, consisting of changes in consciousness, the other physical, consisting of changes in the cerebrum. These two series run parallel with one another in the sense (1) that they take place in the same time, and (2) that any definite cerebral condition is accompanied by a definite psychical condition; or, to put the same thing from the other point of view, if any psychical state is repeated, then the cerebral state which synchronised with the first psychical state will be repeated with the second. The two series are supposed not to interact with one another.

This theory is evidently in a state of unstable equilibrium; we inevitably tend to throw the emphasis either on the physical or on the psychical series: if we choose the former, and if at the same time we admit that mechanical law holds throughout the physical world, we simply arrive at the mechanical theory set forth above, and consciousness becomes an "epiphenomenon." If we choose the latter, and if at the same time we are prepared to admit that mechanical laws do not hold throughout the physical world, then the theory becomes indistinguishable from the one we have just discussed.

If, again, we attempt to regard the two series as of equal value,—if we say they are simply two aspects, neither of which takes precedence of the other, then we say "aspects of what?" Are we to postulate some reality which thus manifests itself, and, if so, what is the reality?

Moreover, a moment's thought will convince us that this theory has been constructed with the facts of brain action (the "given" of the physiologist) too much in view, and the facts of mental action (the "given" of the psychologist) too little. If the mind were simply a stream of sensations then the theory might pass. But the essential characteristic of our mental life is not that we feel sensations, but that we group disparate sensations together and give them unity. And this unity belongs exclusively to the mental side. Our study of aphasia has shown us that before we can understand a written word, the auditory speech centre, the visual speech centre, and an ideational centre must all function: there is no one centre in the brain which co-ordinates all those and gives them unity. If we study the matter from the mental side, we have no reason whatever to suspect all this division of labour; if we study the matter from the physical side alone, we have no reason to suspect any unification.

It may be said that the mental act corresponds to the entire cortical process, and that this is the appearance of the unity on the physical side. But, as Professor James has pointed out, we have no reason to regard the brain as a unity in its own right. Imagine the world as to the physicist it really is, picture the circling atoms in their ceaseless dance, and then say why those particular ones which form a brain are to be regarded as a unity. As an illustration think of the constellation of Orion. We see clearly that there is no real unity here: we group together the stars included merely for fanciful reasons of our own. But if we could imagine one intelligence to rule those particular stars and no others, then we should have a real unity. Well, it is replied, that is exactly what we have in the case of the brain; this particular congeries of atoms represents one intelligence. But that is precisely the point we are urging: the unity is exclusively a feature of the mental side. If this be so, how can the psychologist admit that the physical series runs parallel with, or represents, or even corresponds to, the psychical series, if these words are taken to imply that the two series are of equal value?

Thus the theory cannot possibly be an ultimate one; but in the form in which we have stated it above it probably represents facts truly enough, and so may be useful as a working hypothesis. It is in this way that Professor Stout, for example, uses it in his Manual.

§ 10. *The theory of Interaction.*—There remains now but one more theory which we need discuss, and that is the ordinary common-sense hypothesis of Interaction. This theory is supported by such psychologists as Professor Ward and Professor James. By Professor James the name "soul" is given to the unity which holds together our different sense impressions and gives us personal identity.

The point which the interactionists are concerned to defend is simply this—that man is a real agent in the course of events; that he is not simply caught up in "the dance of plastic circumstance," but that in his reaction upon his environment he has initiative of his own; that, in a word, his sense of duty and his sense of responsibility are not mere illusions, but indeed among the most ultimate truths we know. This point we at least readily concede.

But when we come to inquire more particularly as to the mode of interaction—*i.e.*, as to the exact connection between mind and body—we find that what is advocated is not an action of "bare mind upon bare body," to use a phrase of Mr Bradley's, or *vice versa.* This crude duality of the seventeenth century philosophers has been left far behind. The theory resolves itself into a spiritual or, as it is called, idealistic interpretation of the universe, and thus is not in essence to be distinguished from that explained in § 5.

As has been pointed out, no one of these theories can be held to be established, since each is still defended by competent men. In this work the language of interaction, as the least cumbrous and the most allied to that of ordinary experience, will be generally used; but occasion may arise when the language of parallelism will be more convenient—as it certainly represents what is for us, at present at least, a partial truth,—and in that event its language will be freely adopted. This chapter will avail to warn the student against attaching undue importance to either mode of expression.

We now add references for reading. An elementary account of the nervous system in its relation to the mind will be found in Sully,* *Human Mind*, vol. i., ch. iii., and (with reference to more recent researches) in M'Dougall,* *Primer of Physiological Psychology.* For fuller information the standard works on Physiology must be referred to.

Four main theories of the relation between mental and material existence are discussed by Höffding,* *Outlines of Psychology*, ch. ii., who accepts the theory of parallelism as philosophically final, basing his position chiefly on the assumption that the "mechanical" conception of material reality is inviolable. The resulting view has been called the "Double-aspect Theory." It is defended by Bain, *Mind and Body;* Lewes, *Physical Basis of Mind;* Paulsen, *Introduction to Philosophy;* and others. Stout (*Manual,* Introd., ch. iii.), Münsterberg, and Ebbinghaus deny interaction, but accept parallelism as final only for psychology. This whole conception is critically examined by Mellone,* *Philosophical Criticism*, ch. ii. (Appendix), and A. E. Taylor, *Mind*, vol. xiii. p. 476 (N.S.), who defend interaction. Similar views are adopted by James, *Principles of Psychology*, vol. i. pp. 138-144, and Ladd, *Elements of Physiological Psychology*, pt. iii., ch. iii.; and see especially Ward,* suppl. art., "Psychology," *Ency. Brit.*, vol. xxxii. pp. 66-69, and the same author, *Naturalism and Agnosticism*, vol. ii.

A "transmission-theory" of the relation between mind and brain is suggested by James in his booklet on *Human Immortality*, pp. 32-58, 122-124.

The articles "Mind and Body" and "Double Aspect Theory" in Baldwin's *Dictionary* are valuable.

CHAPTER VI.

MENTAL ACTIVITY.

In the study of most sciences the best method is to begin with the simplest phenomena, and from them to proceed gradually to the more complex. In psychology, however, so far is this from being the case that it is hardly too much to say that the reverse is true. For the simple phenomena in psychology are rarely or never to be found in an adult mind—if indeed anywhere in nature,—hence they are highly abstract and difficult to grasp; whereas the complex phenomena present themselves daily, are concrete and familiar. For this reason, in psychological text-books written in accordance with the ordinary rules of scientific exposition, the easiest chapters are found at the end, and the hardest come at the beginning. Hence in this chapter we shall begin our study of mental activity by examining it as it is of daily occurrence in our own experience; we shall then seek to determine its origin in the individual and trace its growth; and last of all, we shall inquire in what sense it is to be regarded as one of the fundamental aspects of mental life.

§ 1. *Voluntary and ideo-motor action.*—When we begin to consider ourselves or others as persons, it is obvious to us that our importance as members of society consists most largely in our actions. It is indeed only through action that we can affect the outside world (*i.e.*, our physical environment or our fellow-men) at all. When we speak of a man's character, what we have primarily in view is the way he will act, or may be reasonably expected to act, in any given circumstances. This does not, of course, mean that activity is to be found by itself —at least, from the actor's point of view. When we perform any act, we do so because we have a certain feeling and a certain knowledge. Thus I determine to go for a walk. Let us detain for a moment this state of mind which we call determination and examine it. It involves the idea of a walk gained from previous experience, for without such an idea clearly no such determination could be reached. It also involves an anticipation of enjoyment such as accompanied previous walks, and this gives a pleasing tone to my present state of mind. Thus knowledge and feeling are both involved, but in neither of these does the essence of the state consist, though it would, I suppose, be very difficult to make a being who was incapable of forming a determination understand exactly what else is required. The notion will have to be more particularly analysed hereafter. Meanwhile let the reader examine his own experience in any such state as that described above, and removing therefrom all that pertains to knowledge and feeling, let him regard the residue as what we mean by activity.

In the case considered the mental state finds its culmination or satisfaction in bodily action : we rise and go. But such an outcome is not necessary. We may determine to stay where we are. Here the mind is active no less than before, but no bodily action follows. This non-fulfilment of the idea implies a more complex type of mind. The natural course of events is for the idea to pass into action. No sooner said than done, is a common phrase. No sooner thought of than done, describes a large part of our life. This ideo-motor action, as it is called, often happens so quickly that we are hardly aware of the presence of the idea before the action has taken place. Thus, when I am deeply engaged in reading, to my astonishment my hand suddenly brushes across the page. I then perceive that a fly had settled there. At least this appears to me to be the order of events, though consideration shows that the action must follow upon the perception of the fly.[1]

The impulse to imitate, which is so powerful a factor in education, may be largely resolved into ideo-motor action. The example of another brings the idea before our mind in a singularly vivid and persistent form. It is in this way also that fashion rules her votaries.

So strong is the moving power of an idea that sometimes it will pass into action even against our own interests. Sir Henry Smith, ex-Commissioner of the City of London Police, says that, after the memorable window-breaking in Pall Mall of the year 1886, he always, if danger threatened, had road-metal railed in and guarded, for the stones lying temptingly to hand had a fascination for the "rough" which he could not resist. It is not difficult to conceive that many ordinarily law-abiding citizens might easily be led to join in the "fun." Mob-action may largely be accounted for in this way. So also, without any desire to commit suicide people have thrown themselves over precipices simply because the idea of so doing obsessed them. Similarly ideas often pass into spoken words without our wishing them to do so. It is related of Dr Almond of Loretto that, conversing once with a former pupil, he said: "I always considered you a remarkably fine example of the commercial mind." The former pupil was feeling rather pleased, when Dr Almond, thinking aloud, continued: "It is, of course, the lowest type of mind."

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[1] Of course the perception of the fly had not passed beyond the margin of consciousness, and probably never would have done so but for the more striking perception of the hand movement.

Now, are these ideo-motor acts to be regarded as voluntary? The instances given in the last paragraph would seem to determine this question in the negative. It is true that we are frequently ready to accept these actions, to identify ourselves with them subsequently, but the very fact that we also frequently repudiate them and declare they have taken place against our will shows that a pure ideo-motor act is not to be regarded as voluntary. In primitive people and in children the whole tendency of ideas is to pass into action. "My legs feel like running," said a boy. A younger child would not pause to observe the feeling. His legs would begin to run. In adults it is more difficult for a motor idea to run its course without interference, because numberless tendencies and dispositions are ever, as it were, lying in wait to impede or further its course. Thus, when the idea of a walk arises, if our habit of work is strong, the idea of an unfinished task may rise in such force as to possess all consciousness, and drive the other altogether from the field. Even here the particular action which follows need not be voluntary; for ideas, as we have seen, possess a motive power of their own, and other things being equal, the strongest will win.

How much of our active life, then, does this term ideo-motor cover? The answer to this depends partly upon the exact significance which we attach to the term. Reflex actions, such as hiccough, sneezing, blushing, are of course to be classed separately, and indeed belong less to psychology than to physiology. Some writers distinguish also a type of action which they term "sensori-motor." Such acts would follow on "sensation" as ideo-motor acts follow on thought. The instinctive movements of the infant, such as grasping objects placed in the palm, or sucking anything placed between the lips, might be here included. It is somewhat difficult to find a simple example in adult life; but perhaps our start on the occurrence of a loud noise or our swift shrinking from a pin-prick may serve as examples of what is meant. Often such acts pass rapidly into the ideo-motor class: thus sucking ceases to be sensori-motor as soon as the child knows what is to be expected from its bottle.

On the other hand, acts which become habitual tend to sink from the ideo-motor to the sensori-motor class: in any train of action which through long practice has become automatic we seem to be guided by the sensations as they rise, although we cannot be said to have any idea in our minds of the movement which is to follow. Thus we cannot tell how we put on our clothes though we do it in the same way every morning, nor could we write down a piece of music which we knew by heart without getting the *feel* of the chords into our fingers.

The ambiguity of the term "ideo-motor" occurs not so much with reference to those actions above mentioned, which may be regarded as being on a lower level, as with respect to deliberate acts which may be regarded as being on a higher level. Professors Stout and Baldwin (*Dictionary of Philosophy and Psychology*, vol. i. p. 507) say, "The term is sometimes limited to actions which are non-voluntary or involuntary, but the better usage includes voluntary action in the ideo-motor class." Professor James says, "Wherever movement follows unhesitatingly and immediately the notion of it in the mind, we have ideo-motor action" (*Principles of Psychology*, vol. ii. p. 522). It is in this latter sense that we have used the term, and when it is so used the class of actions denoted seems to have no constant relation to the class of voluntary acts. In common usage we regard them as voluntary when the will identifies itself with them as they pass into action or after they have passed into action, as involuntary when it repudiates them. But if we imagine the state of mind which is the precursor of the act, detained before the act has taken place, there is evidently no element of will in it. All such acts might well be classed as non-voluntary, unless it is thought advisable to reserve that term for classes of acts with which the will is powerless to interfere; in which case students of logic will appreciate the statement that the *fundamenta divisionis* are different in the case of the species ideo-motor and voluntary, and we shall be guilty of a cross division if we seek to range them under the same head.

Let us then consider the different classes of action as they appear in their relations to the will.

The following types may be distinguished :—

1. Voluntary—consisting of—(*a*) Volitional Action, done expressly with an act of will following upon deliberation; (*b*) Unvolitional or Spontaneous, which occurs in accordance with the dominant purpose of the time, but need not follow upon an express volition relating to that particular act.
2. Non-voluntary—performed in independence of the will—*e.g.*, reflex or automatic actions.
3. Involuntary—opposed to the will, occurring in spite of a volition to the contrary (or of a volition which would have existed had there been time and opportunity to form it).

§ 2. *Voluntary action as deliberate choice.*—If a light is flashed in front of your eyes, your eyelids shut whether you will or no. You cannot prevent the movement. But if some one says to you, "Raise your arm," then you do so or not as you choose. This peculiar feeling of choice seems always to accompany volitional action.

It is important to realise that there are two kinds of choice which in our ordinary thinking are often confused. When we hesitate between two courses of action our indecision is sometimes due to ignorance. Thus, in reading for an examination we may be in doubt which text-book to buy, yet we may be quite certain that the one we wish to buy is the one which follows most closely the traditional lines of our examination. We do choose here, and our action is evidently guided by our choice, but the choice is not one of the will, which has been decided from the outset. It is exclusively a determination of the intellect. The possibility of a volitional choice has not even risen in our mind, for all along we have had no thought beyond that of passing our examination.

But suppose we realise that the best text-book for the examination may not be the one best fitted to impart a thorough grasp of the subject, then we may have presented to us a genuine choice of the will. We respond to it by the decision: It is right for me to strive to know my subject thoroughly rather than merely to pass my examination,—at least, we do if our moral sense in matters intellectual has been cultivated; if not, we say, What care I for my subject so long as I can stir up enough dust to blind the Rhadamanthine eyes of my examiner? In either case our action follows in accordance with the decision, and by the decision we have made a standard for the will; the next time such a state of affairs arises we shall require to make only an intellectual choice, the principle of our choice being already determined. Thus a choice of will involves a choice between two ends; an intellectual choice is concerned only with the means to an end already adopted.[1]

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[1] See *Mind* (N.S.), No. 23, where this distinction is carefully worked out by Mr A. F. Shand in a paper called "Types of Will."

As these standards in accordance with which we will to act are being fashioned in youth, it follows that youth or adolescence—when we begin to take our lives into our own hands—is pre-eminently the time for these choices of the will. In maturity a real choice of the will more rarely arises; our standards are relatively fixed—in other words, our character is set, and choice consists in determination by the intellect which of our possible courses of action accords with our settled principles.

It is important to be clear about those two modes of choice, for the difference is a momentous one. A volitional choice means a change, or at least a distinct step in the growth of character: an intellectual choice is a confirmation of the character already won. When Satan exclaims, "Evil, be thou my good," it is a volitional choice; and in thus accepting evil as his avowed end he makes a definite advance in the evolution of his character. When Coriolanus bends his proud revenge to his natural love for his mother, he makes a volitional choice which so alters his character that our sympathy goes forth to the arrogant man whose motive force had hitherto been but a low ambition. When Macbeth resolves on Duncan's murder, and so slays his honour on ambition's altar, he makes a volitional choice: when he decrees that Banquo too must perish, it is because his intellect decrees that only so can he retain his crown.

It is, of course, obvious that an intellectual decision may so define or modify our previous standard of action as to be in some degree volitional. Thus, when Brutus resolves upon the assassination of Cæsar, he decides that in the interests of patriotism even murder is justifiable. He might have qualified his patriotism otherwise and decided against the dreadful deed, but that his decision is in the main an intellectual one is shown by the fact that after this base murder of his best friend his character does not deteriorate in the way that Macbeth's does.

From such examples as have been given, and also from a consideration of our own daily lives, it appears that volition in its highest and most complex form affects not so much single acts as courses of conduct. We are almost startled sometimes to realise how little volition explicitly enters into our daily lives. We are creatures of routine. We rise in the morning, eat our breakfast, go about our daily work, all as a matter of habit. Even our conversation is largely mechanical. We say what we have often said or have heard others say. We rarely pause to choose our words, or even to consider whether a thing is so or not. Many people, as they themselves allow, simply say "whatever comes into their heads"—ideo-motor action, nothing more. Many repeat the same stories in as nearly as possible the same words. And when voluntary decision does appear, it, as a rule, involves a whole series of events which are not in themselves determined voluntarily. Volition overleaps the means and hastens to the end. The means are for the most part relegated to habit. Let us suppose the question is whether I shall enter the university or go into business. Into many a man's life this question never enters as a choice; he is simply brought up with the one end in view or the other. Suppose, however, it is presented as a choice: then, what happens? I may have no hesitation; the attractions of the one course may to me far surpass those of the other. But suppose I hesitate. Then I proceed in this wise. I forecast my future in the two cases. I see myself as a successful business man and as the member of some profession. I consider the different natures of the work I shall have to do. I ask myself which appeals most to me, which I am best suited for. The subject fills my mind, everything that happens seems to bear upon it, my whole being is in a turmoil, I can give my thoughts to nothing else. Then, often quite suddenly, I determine on one course or the other, and the tumult subsides. This decision involves a throwing of ourselves into the line selected, a dwelling upon its advantages, and a resolute turning away from the attractions possessed by the other, if, indeed, these attractions continue to be felt at all. Hence, Professor Stout finds that the distinguishing characteristic of a voluntary act is the entrance of self-consciousness as a co-operating factor. It is at such times that we peculiarly feel that we are not the mere sport of circumstance, but are free agents and masters of our fate.

Once our choice has been made we take the initial steps to carry it out, and these may involve a considerable amount of volitional action combined with choice; but once these preliminaries are over, our life moves once more on the rails laid down by habit and motor ideas. And, curiously enough, the more this is the case—that is, the less my volition now appears—the stronger is my character reckoned. If I continue to exercise my volition, if I have to decide every morning whether or not I will go to my classes or to my office, if I continue even to *feel* counter-attractions, I am reproached by myself and others as a weakling. In the mechanism of life does our strength lie. Here, indeed, it is he that is bound that is most truly free.

§ 3. *What is the "strongest" motive?*—In speaking above of ideo-motor action, we said that when two opposing ideas appeared in consciousness the strongest would win or express itself in action. So in the case of voluntary action, it is sometimes said that the strongest motives win. Now as this statement is sometimes used with great plausibility and ingenuity to support the mechanical view of human life, it is of the utmost importance that we should make clear to ourselves what it really means. If the statement were to be of the slightest scientific value, the motives in question would necessarily each have a definite motive power, but this is notoriously not the case. In the very process of examining them they shift and change in value, sometimes even ceasing to have any motive power at all. As a matter of fact, the statement is either untrue or a meaningless assertion of identity. If it signifies that the motives which were originally strongest win the day, it is clearly false. Thus, in the case imagined above, the idea of the wealth I shall gain as a man of business may be at first the strongest motive in consciousness, whereas in the course of my deliberations it may become quite subordinate. If, on the other hand, it signifies that it is the motives which are finally strongest which win the day, then it is true, but at the same time valueless ; for the whole difficulty lies in the very point ignored, and that is, how do these motives become the strongest? The answer is that in imagination I carry them on to their fulfilment, and compare myself as I should be in these circumstances with the self that I desire to be : if the two accord, the motive is strengthened ; if they clash, then the motive is weakened or rejected.[1]

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[1] It is, indeed, only as a matter of convenience that we talk of motives as if they had a continuous identity. The identity they possess is a mere identity of reference—*i.e.*, what we regard as the same motive persisting through time is a succession of motor ideas referring, roughly speaking, to the same object.

This is a difficult process involving intellectual insight. For, as is well known, motives attractive in themselves may be glossed so as to appear in harmony with others to which they are really opposed. Sometimes it is only when the deed is done, and the pleasure which we anticipated is in the past instead of the future, that the motives which actuated us stand revealed in their true colours. We are then able to brand as selfishness what we had thought was a high-minded love of art, or as a mean shrinking from the disagreeable what we had thought was an innate refinement of nature. Sometimes it is the opinion of others which grants us this revealing light, and we turn from our projected conduct with an utter revulsion of feeling. Often, however, the comparison takes place almost instantaneously, and we accept or reject the proposed action as soon as we are aware of it. Again, the ideal self is so inwoven with our whole psychic life, that it not only rejects ideas from consciousness, but prevents their ever entering it. Thus, however much we may desire our friend's possessions, most of us never even think of stealing them.

The idea of the self is thus a relatively constant motor idea. In saying this we do not of course imply that the idea remains the same throughout life; the identity which belongs to it is of the same nature as that which belongs to the body. And it is to its power of development that it owes its permanent power as a motor idea, for its essential peculiarity is that it never works itself out: in other and more familiar words, our ideals are always in advance of our achievements,—our reach exceeds our grasp. The idea is often vague, even where it is strong; it is often not even self-consistent, as when we allow ourselves to do as members of a class what we would not do as private individuals. And, paradoxically enough, it is with this ill-defined, inconsistent, shifting ideal which we never are but only hope to be, which exists only in our imagination, that we identify ourselves most fully. When it is successful we feel that *we* are successful; when it is hindered or obstructed—as when Esau sold his birthright for a mess of pottage—we feel that *we* have been overcome by some hostile force. The building up and strengthening of this self is one of the most important problems of education. We must consider its genesis and growth more fully hereafter: meanwhile the conception will be rendered clear enough to every one by his own consciousness.

The term *motive* is ambiguous. In its widest sense it signifies any mental process determining volition,—including bodily feelings, subconscious processes, and unconscious dispositions. In a narrower sense, it is restricted (as in the foregoing section) to any conscious *idea of purpose* which enters into the determination of a voluntary act. Green, *Prolegomena to Ethics*, bk. ii., ch. i., expounds one form of this view, which really identifies "motive" with "desire" (see § 9, below). Cf. also Stout, *Manual of Psychology*, bk. iv., ch. x.

§ 4. *Feeling of effort.*—We have seen that our most typically voluntary acts, besides involving this reference to the self, are always attended by choice,—whether between two or more incompatible courses of conduct, or simply between acting and refraining from action. Many of them are attended also by that unique feature of our mental life—the feeling of effort. Here we seem to throw our weight, as it were, into the scale of the comparatively weak idea and carry it to its conclusion in spite of opposing ideas which are stronger in their own intrinsic nature. It is in such cases that we have the most convincing experience of ourselves as agents.

Often when we are active physically or mentally—as when we walk or converse or let our thoughts wander—we can, if we are of an introspective turn of mind, feel ourselves merely passive. Our life flows on without our guidance or interference. But in the case of effort we are essentially actors,—we take the life-stream and direct its flow in the direction we desire.

Yet the self which intervenes in these cases cannot in the present state of our knowledge be conceived as a *deus ex machinâ.* It is influenced by many factors which we can express more easily in physiological than in psychical terms. Thus illness, fatigue, the digestive processes, all affect our power of producing effort. But to admit that the amount of effort which we can exert on any given occasion is partly regulated by circumstances which are not at that moment under our own control, is not to admit that the whole feeling of self-activity is an illusion. The former admission is indeed bound up in the very conception of growth, for growth simply means that we can do to-day what we could not do yesterday. Effort is thus a thing of degrees, but this does not prevent it being an essential attribute of humanity. We are not, as the extreme physicist would have us, simply whirlpools in the stream of universal life. We are rather to be likened to fountains of living water.

This action with effort is to many people an only too frequent fact of experience. Sometimes it may be trivial, as in Professor James's favourite example—the getting out of bed on a cold morning; sometimes it is momentous, as when Cranmer thrust his hand into the flames, or when Brutus doomed his sons to death. But what do such actions mean? In them we seem to be fighting, but the foe is within. We seem to be taking a difficult way, but the difficulty is not in outward circumstances, —it is in ourselves and is part of ourselves.

> "The genius and the mortal instruments
> Are then in council, and the state of man
> Like to a little kingdom suffers then
> The nature of an insurrection."

In our endeavour to see clearly what in such cases is happening in "the state of man," there is a physiological conception which will greatly help us. This is the conception of different levels in the central nervous system—a conception which we owe to Dr Hughlings Jackson, who by his study of epilepsy was led to distinguish three different levels.[1] The cells of the lowest level receive stimuli from the periphery—*i.e.*, all tissue in which sensory nerves terminate—and they direct the response. The action may be diagrammatically represented thus :—

A feather tickles your throat at S (fig. 2); the irritation is conveyed along the sensory nerves to the cells concerned; rushing down to the larynx M comes the command to contract, and you cough. The diagram represents what is known as a reflex arc, and the nature of the nervous elements is such that every passage of a stimulus along this arc facilitates the passage of subsequent stimuli.

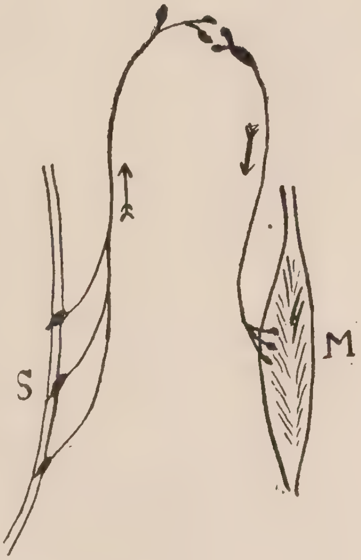

Fig. 2.

The cells of the second level do not communicate directly with the periphery at all; they receive news and issue their orders only through the cells of level 1: diagrammatically we figure it thus (fig. 3).

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[1] For a fuller account of the theory of different levels, see M'Dougall's *Physiological Psychology* in the "Temple Primers."

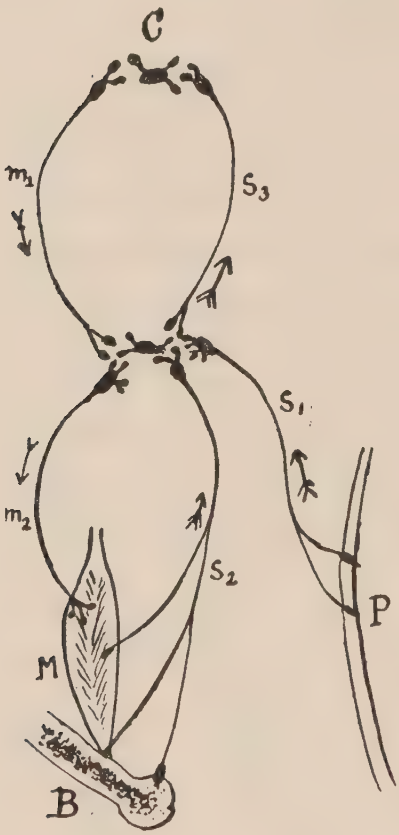

Fig. 3.

C, sensori-motor centre in cerebral cortex; P, periphery (skin, retina, &c.); M, muscle; B, bone; s_1, s_2, s_3, sensory nerves conducting stimuli towards the cerebral cortex; m_1, m_2, motor nerves conducting stimuli from the centres to the muscles; s_1, a nerve of special sensation; s_2, a nerve of kinæsthetic sensation (ch. vii., § 2).

The cells of the special sense-organs belong to the second level, and the arcs which are thus superimposed on the arcs of the first level are known as sensori-motor arcs.

The cells of level 3 have the same relation to the cells of level 2 as those have to the cells of level 1. To this third level belong the cells which function in the association of the information which reaches us by means of the special sense-organs (eye, ear, &c.), and also those cells which function in our highest and most abstract modes of thinking. Of course the levels may be more in number than three, but to the psychologist the number is of no importance in comparison with the principle. Microscopic investigation of the brain, so far as it has gone, lends support to this theory; but here the brute obstacles in the way of ascertaining the mere facts are so great as to be inconceivable to any one who has not frequented a physiological laboratory.

The theory agrees well with the conclusions the psychologist has reached by his very different line of investigation: it even, as we have said, aids him to form a definite conception of what is taking place when action is accompanied by the feeling of effort.

We have seen that the cells of level 1 can of themselves direct the course of an automatic reaction such as a sneeze or a cough. But the stimulus which comes from the original irritation of the larynx not only (through the mediation of the cells) serves to direct the response, but also passes upward to the cells of the higher levels, and simultaneously with their entry into activity we become aware that we have an impulse to sneeze. Suppose we are in the position of Polonius behind the arras. The explosion in such circumstances would, we perceive, be in the highest degree inimical to our interests; and hastening down from the cells of the highest level through those of the lower and down to the muscular tissue comes the urgent contradictory command, Do not sneeze on any account.[1] We may succeed in restraining the impulse, or we may not. In the latter case we have an excellent example of an involuntary action—one taking place against our will. Had we been in a position to disregard noise, we should simply have allowed the reflex to run its course,—we should neither have hindered nor helped it, and we should have performed a non-voluntary action,—one with which the will had nothing to do.

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[1] The student must be on his guard against supposing that these commands from the higher centres are merely inhibitory. The manner in which inhibition is effected is still a disputed question among physiologists.

We said above that when an action takes place with effort we appear to ourselves to be fighting against an inward foe. We see now that this feeling of ours really represents the truth. In all such cases the most recently developed part of us—that most distinctively human—is for its own ends opposing some impulse which through the long course of evolution has become inwrought into the very fibres of our being. The first law of the organism is self-preservation. What of the man, then, who deliberately stands up to be fired at? He has consciously and voluntarily set up another end opposed to the elementary law of his organism, and he must expect to feel its endeavours to repel the outrage. Sometimes, it is true, the energy of the higher centres is such that the craving of the lower ones is unfelt: we embrace the flames that promise us a martyr's crown; we cast ourselves down in the ditch content if our bodies serve but as a bridge to help our comrades to victory. But such moments of excitement are rare: more frequently we feel it would be easier to let the higher centres relax and to drift as our lower nature would have us.

We often wonder why it is that trifles demand from us such an excess of effort. Why do we sometimes so hate to write a tiny note, when we will freely wear ourselves out attending on the sick-bed of a friend? Why do we stand and shiver on the brink of our cold morning bath when neither thunder, lightning, hail, nor rain will prevent our keeping our appointments? It is said that no man is a hero to his valet, and we cannot help feeling that Job had on the whole an easier time than his wife.

The explanation of these things lies in the fact that emotion has a powerful and widespread effect upon the muscular system.[1]

> "His strength was as the strength of ten,
> Because his heart was pure,"

is no more than a just tribute to the power of an indwelling passion for righteousness. The strength of an angry man is well known. Even Shylock's indignant sense of his wrongs makes him straighten his cringing figure and speak out like a man. The young fair Juliet braves the charnel-house itself in her desire for Romeo. Effortless is the power that does such high deeds. The whole nature of man is swept along in the full tide of living energy, and there is no faint heart to cry back. But when the emotion fades and our Titan purpose mocks us, a faint ghost of its former self, it is then that we need to call to mind Matthew Arnold's lines—

> "Tasks in hours of insight willed,
> Can be through hours of gloom fulfilled."

It is in these hours of gloom that effort appears, as we doggedly determine to see the thing through.

We see now why effort is so prominent in trifles. It is because we cannot draw on the sources of energy locked up in the emotions. It is hard for a matter-of-fact adult mind to find anything heroic in the morning plunge, or in the reluctant creeping out of bed; but the child, practical little psychologist that he is, knows how to overcome such hills of difficulty. The small boy eats his detested porridge without a murmur, because at the moment he is an intrepid explorer tortured by Indian chiefs, and he is too proud to give them even a grimace to rejoice over. The little girl swallows the bitter medicine almost with avidity, because her dolly has a cough which must be cured. When we can realise that the trifling matters wherein we so often take the easier path are really an integral part of a larger scheme of things, when we recognise that our ideal of our self is injured by every failure, then our whole self-feeling comes to our aid, and the struggle tends to disappear. In the same way a sudden interest will entirely prevent the feeling of effort arising; the shout of Fire and the smell of burning would bring the keenest bed-lover to his feet in an instant without any difficulty.

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[1] See ch. ix., §§ 3, 5.

We have spoken above (§ 4) of the opposing impulses as emanating from nerve cells on different levels; but the student cannot too often remind himself that the whole meaning of the drama lies in the psychological dispositions which underlie and condition the action of the nerve cells. It is not a contest between two natural forces, as when friction brings a cannon-ball to rest; it is a contest between man's higher nature and his lower, and the story of how these come to be opposed is the story of evolution.

§ 5. *Action against the will.*—The contest is not, of course, always between our conscious self and an automatic or semi-automatic tendency. Frequently a strong impulse enters consciousness which yet we know we will not to carry out. Here are two examples from the records of Mr Holmes, the London police court missionary. A young man of respectable family who was forced by no need to dishonest courses, an allowance being made to him by his father, was brought before the magistrate for stealing a watch. Against him stood eight previous convictions for the same offence. Here is his own account of the matter. "All I can tell you is that as I was going along the street and passing the jeweller's shop, something said to me, 'Go in and get a watch, go in and get a watch,' and I had to go in and get one." The second case is that of a woman who was constantly getting into trouble for stealing boots. Her piteous cry was, "Don't blame me, Mr Holmes, don't blame me; I can't help it: I would if I could, but I must steal boots." She wrote to Mr Holmes subsequently from the country, and in every letter boots were referred to; in one otherwise lucid she mentioned them, without much reason, four times. We all suffer occasionally from such morbid impulses in milder form. A longing to break something, to kick the chairs about, to laugh in church, will be felt by people of the most even self-command. Or a tune may haunt us, or some wretched jingle, such as Mark Twain's lines—

> "Punch, brother, punch with care,
> Punch in the presence of the passenjare,"

and we get peace from these demons only by allowing them to run their course,—by beating out the tune or finishing the rhyme.

In pathological cases, where the morbid impulse is criminal in nature, very frequently a voice urges its gratification. This symptom seems to indicate some failure in the adjustment of the relations between the nerve cells, and a *quasi* independent action on the part of some. Thus the "voice" is caused by illegitimate excitation of the sensory speech centre. The dissociations of personality which have of recent years attracted so much the attention of psychologists probably find their beginning in such a state as this.

Involuntary actions, then—actions opposed to the will,—may, it seems, occur in two ways. A contest may take place, and the involuntary impulse may prove so strong that the man gives in. Sometimes he himself, deplorably ignorant of the laws of his own mind, aids this consummation by dwelling upon the temptation—whether with longing or with loathing matters little, so long as he thus re-enforces the idea. This is often the case when a physical craving, as, for example, for drink or opium, is gratified. On the other hand, sometimes there is no contest, because our higher self is not aroused to a sense of what is passing until too late. The impulse rushes on to fulfilment, using, it may be, all the available energy of the brain in its course, as when the passion of anger possesses us; and we can only gaze regretfully at the deed which is done and say, "I did not *mean* to do it." Or, again, habit may have so eased the performance of the action that it is done before we think. Thus a mother may rub mustard on a child's thumbs to cure the unpleasant custom of sucking them; and again and again the thumbs will find their way to the child's lips, in spite of the fact that he knows an unpleasant taste will result.

We now add references for further study of the topics discussed in the previous sections. A complete list of references for the topics embraced under developed Volition would only bewilder the student. We select those which are calculated to be most useful to the English reader. The subject of developed volition is carefully reviewed by Sully,* *Human Mind*, vol. ii., ch. xviii., and in a very instructive manner by Wundt, *Ethics*, Eng. trans., vol. iii. ("Principles of Morality"), p. 3ff; Stout, *Manual*,* bk. iv., ch. x., and in *Mind* (N.S.), vol. v. p. 354. Two very important references are: Bain, *Emotions and Will*, pt. ii., ch. vii., viii.; James, *Principles*, vol. ii., ch. xxvi. (especially "types of decision," p. 531; "mental effort," pp. 535ff, 548; the "fiat," or state of consciousness which exists at the moment of deciding between alternative courses of action, pp. 501, 526, 561, 568); more concisely in James,* *Text-book of Psychology*, ch. xxvi. On Habit as a formative factor in character, see Bain, pt. ii., ch. ix.

On the connection between self-control and the efficiency of the higher nerve-centres, see Carpenter, *Mental Physiology*, bk. ii., ch. xvii., xviii.; and Ribot,* *Diseases of the Will*, Eng. trans., ch. i., ii.

With regard to the *freedom* of the Will, the following are the psychological questions that arise: (*a*) Does volition involve anything that can be called a *consciousness of* freedom? (*b*) In what sense can a voluntary act be called "free"? Both questions have given rise to much controversy, the nature of which will be evident from Bain,* *Mental and Moral Science*, bk. iv., ch. xi. ("History of the Free-will Controversy"). "Consciousness of Freedom" has been defined as "consciousness that a decision arises from the self, and not from conditions in any way foreign to the self." "Freedom" has been ascribed to voluntary decisions in three senses: "(*a*) that volition is free when, and so far as, it is due to the character and motives of the individual—because it is *his* action (as distinguished from actions due to the application of external force, or to physiological reflex); (*b*) that the free volition is in some way and to some extent independent of motives—being due to a self not entirely accounted for by character, motives, and circumstances; (*c*) that free action means action in accordance with reason, reason being thus regarded as a man's true self." Bain (*Emotions and Will*, pt. ii., ch. xi., § 9) disputes the applicability of either metaphor ("freedom" or "necessity") to volition; but his analysis naturally leads to the position (*a*); (*b*) is well represented by Martineau, *Study of Religion*, bk. iii., ch. ii., and James, vol. ii. pp. 569ff; (*c*) leads into the metaphysical aspects of the question (see Caird, *Critical Philosophy of Kant*, vol. ii., bk. ii., ch. iii.); in this sense "moral freedom" becomes an *ideal* to be aimed at, rather than an actual quality of human nature.

§ 6. *Habit.*—We proceed to describe a law of life which is perhaps the most fundamental, the most far-reaching, of all—namely, the law of habit. Numerous examples of the power of this property of our organism will occur to every reader. A well-worn story tells how, when a mischief-lover shouts "'Tenshun," the ex-soldier drops his pot of beer as his muscles involuntarily stiffen to the word of command. Miss Frances Power Cobbe sat in a room to write where she had sat and studied eight years before. She felt her feet moving restlessly under the table, and then remembered eight years before she always had a footstool. It was this the feet were seeking.[1]

Habit guides our rising and our retiring, our dressing and undressing, our eating and drinking—in fact, all the minor incidents of life. More than is commonly realised does habit guide both our emotions and our thinking. As Henry Sidgwick puts it—

> "We think so because all other people think so;
> Or because—or because—after all we do think so;
> Or because we were told so and think we must think so;
> Or because we once thought so and think we still think so;
> Or because, having thought so, we think we will think so."

Instances occur every day which show us how deeply habit is engrained in our nature. One morning after coming downstairs I found myself walking into a dark, low press. A moment's consideration brought to my mind the fact that some years ago I had been accustomed to enter this press every morning for my boots, and this habit, disused so long, had taken advantage of my attention being fixed on other matters to reassert itself. The reader is advised to note any similar instances of the revival of forgotten habits.

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[1] Schofield, *The Unconscious Mind*, p. 248.

It is not difficult to form a fairly satisfactory conception of the physiological basis of habit. We have only to suppose that when a neural excitation follows a certain course in the nervous system, it leaves behind it a "trace" which renders the same course easier for all subsequent nervous excitations. When the trace has been very deeply worn by many repetitions of the action, two results follow: 1. It is very difficult for any stimulus which starts the series not to result in its completion: thus, if we play one piece of music very fluently, we should always have a certain difficulty in playing another which began with the same three bars, and the difficulty would occur at the point where the two series diverged. 2. The initial stimulus required to start the series diminishes to a minimum, as does likewise the attention necessary to sustain it in its course. Thus a skilled pianist can play a complicated piece of music and conduct a conversation at the same time. Many people can read aloud with an air of perfect intelligence without "taking in" a word of what they are reading. Here the sensori-motor arcs must be functioning actively, for every movement of the lips, every inflection of the voice, is guided by the visual sense impressions; nevertheless, it is a matter of everyday experience that the thoughts may be engaged on quite other matters.

To bring the physiological theory into accord with the facts of mental life, it is further necessary to suppose that the trace does not materially—if at all—facilitate the passage of the excitation in the reverse direction. We all know how easily we can rattle off the Lord's Prayer forwards; but to say it backwards requires the devil's aid.

Habitual actions have been called "secondarily automatic"; it is clear that when they are fully established they approximate very closely to reflexes or series of reflexes, which are primarily automatic. But insomuch as they are *learned* by volitional effort in the life of the individual, they are to be found in all stages of progress towards complete automatism. During this process two changes take place in the mental life which accompanies the act: (1) the feeling of effort decreases, the action becomes *easier;* (2) attention gradually lapses—*i.e.*, the knowledge and the direction of the movements pass from the focus to the margin of consciousness. These two changes are so frequently experienced by us all that they scarcely require illustration: learning to walk, to cycle, to golf, to play the violin, are obvious examples. With the lapse of attention all idea of an end seems to disappear; hence people who withdraw their attention completely from their automatic movements often find themselves doing very ridiculous things. The story of the professor who, on coming into collision with a cow, removed his hat and exclaimed, "I beg your pardon, madam," is a case in point.

There is some reason to think that the very capacity to discriminate sensations is dependent on the power of the organism to form habits: it is through the progressive adaptation of the nervous system to the sense stimuli that differentiation arises. Thus habit is the foundation of all progress. Specific habits are in early life the stones out of which character is built. Were a child incapable of forming habits, of him indeed might the doom be pronounced, "Unstable as water, he shall not excel." Learning would be to him impossible, for every day would find him just where he was the day before. In later life, however, habit may lead to fossilisation, to loss of the capability for improvement, to dread and dislike of change. Movements may become so automatic that it is difficult to stop them. It is said that factory workers sometimes continue even in their sleep to move their fingers as they require to do in their work; and one of the chief functions of the "rest cure" is to teach people to relax those muscles which the habit of being ever "on the jump" causes them to keep in a state of constant tension. Modes of thought no less than modes of action are subject to habit. It has been said that the advance of science is due to a ceaseless struggle of the third and fourth decades against the fifth and sixth. Harvey himself, I believe, maintained that no one over forty accepted his doctrine of the circulation of the blood. For to change a habit, whether of thought or of conduct, is about as difficult as for the Ethiopian to change his skin. Not only is the organism less plastic, the lines of discharge more rigidly determined, but we have largely identified ourselves with our habits, and in altering them we feel we are mutilating ourselves. Thus Walter Bagehot says that the pain of a new idea is one of the greatest that man can suffer. "It is, as people say, so upsetting; it makes you think that, after all, your favourite notions may be wrong, your firmest beliefs ill-founded; it is certain that till now there was no place allotted in your mind to this new and startling inhabitant; and now that it has conquered an entrance, you do not at once see which of your old ideas it will not turn out, with which of them it can be reconciled, and with which it is at essential enmity."[1]

Any mental function may be described as a *habit* when, through repeated performance, it has become gradually better adapted to its purpose, and is accompanied by a feeling of familiarity and increased facility. The *law of habit* states that any function becomes thus modified by repeated efforts, and has been well described as "the principle of formation and conservation of type in mental operation." Habit is an individually acquired function; "instinct" (see below) is physically inherited. One of the most interesting books, illustrating the laws of habit in animal life, is Lloyd Morgan's *Habit and Instinct.* The most important references for the general psychology of Habit are Bain, *Emotions and Will*, pt. ii., ch. ix., and James, *Principles*, vol. i., ch. iv.; more concisely in James,* *Text-book of Psychology*, ch. x.

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[1] Quoted from the Harveian Oration, 1906, by Professor Osler. *The Lancet*, Oct. 27, 1906.

§ 7. *Interest.*—If Habit is, as appears to be the case, the conservative member of the Government of Everyman, Interest is the progressive. Interest is mainly concerned with what is new, habit with what is old. Some thinkers have identified interest with attention, but the word has certainly a richer connotation. If we consider it as an actual experience of the mind at the moment when it is being experienced, we find that it is indeed always accompanied by attention—generally by attention in very high degree. The greater the interest (whether painful or pleasurable) the greater the attention may be regarded as a self-evident truth. But the same cannot be said of the converse of this proposition—that attention is always accompanied by interest, nor is it universally true that the greater the attention the greater the interest. Thus we frequently give very great attention to matters—such as the adding up of figures—in which we feel very little interest, just because we know we have to get them done. A great deal of scientific work, such as the plotting of curves, the obtaining of averages, any process necessitating long periods of rather mechanical labour, is not accompanied by interest. The feeling, however, flames up whenever any crucial point is reached; it has the effect usually of increasing attention, but sometimes becomes so intense as to defeat its own end and compel a cessation of the work, as when Newton, seeing a chance of his theory of gravitation being verified, became so excited that he was unable to finish his calculations.

Thus the variations in the intensity of the two processes, interest and attention, do not correspond, therefore some factor must affect one or both of them which does not affect the other in the same degree. This factor seems to us to be the relation which the object of the attention process is perceived to have to the self, the self being regarded as a more or less unified system of ends (see ch. xvi.) When this relation sinks out of sight, as in lengthy calculations, interest is in abeyance; when it becomes prominent, as when some result which will repay us for years of toil seems near, then interest awakes. When the process appears to be working out in such a way as to further our ends, then the interest is pleasurable; when the opposite is the case the interest is painful. Thus any one who has a near relative in the regiment engaged will take in the account of a battle an interest which will almost certainly be painful, for his mind is full of the evil chances threatening the soldier whose life is bound up with his own. On the other hand, if, thanks to an optimistic disposition or to a belief in the soldier's lucky star, he has no fear for him, then his interest will be pleasurable, since he looks for his decoration or promotion.

In the case of painful interest care must be taken not to confuse instances where the means of satisfying the interest are repugnant with instances where the pain arises from the prospect of our ends being frustrated.

Thus the scientific interest may take to the dissecting-room a student whose dislike of this means of gaining the desired knowledge may be of the most violent nature. Here none the less the interest is itself pleasurable; the pleasure derived from its gratification is indeed so keen that it usually comes to counterbalance the disgust arising from the uncongenial nature of the surroundings.

But interest exists not only in this way as a more or less fleeting process; the term is used also to denote a comparatively stable condition or bias of the mind. We are said to possess interests; we say we are interested in psychology, in photography, in football, although at the moment we may be thinking of none of these, and besides these individual interests, which are more or less variable, we all as animals have certain organic interests, such as the safety of our bodies and the satisfaction of our needs. These permanent interests in adult life practically make up ourselves. If they were swept away we should be to all intents and purposes dead; and as a matter of fact even our bodies would soon perish, for we should give them neither food nor drink, nor remove them out of the way of danger.

The manner in which the systematised bodies of belief which make up our intellectual and distinctively human interests leap into consciousness to meet and welcome or reject any new element which is connected with them is one of the most striking and familiar phenomena of our active mentation. "I see they have had a message from the American Arctic Expedition." Immediately your polar exploration interest — if you have one—wakes, your consciousness fills with a turmoil of beliefs and vague notions relating to this subject; you fit the new information to the old knowledge, here altering the old to dovetail it to the new, there questioning the new as not according with the old; and the whole process is accompanied by a feeling of pleasurable excitement which we call interest. In the recent wars most people developed a strong South African and subsequently a strong Russo-Japanese interest,—a fact from which the newsboys were not slow to draw their profit. The organised "interests" or psychological dispositions formed in the minds of those who followed the course of events were kept in a constant state of subdued activity, so that the slightest stimulus, or indeed the mere want of any other pressing occupation, brought them into the focus of attention. The interest-feeling, when these topics did occupy the focus, was often painful in the extreme. We would gladly have avoided them, but they concerned us too nearly.

In all action which involves the nervous system it is safe to say that the magnitude of the effect is never dependent on the magnitude of the stimulus. Even in the case of reflex action a mere feather tickling the throat may produce a paroxysm which ends by affecting every muscle of the body. Parallel cases arise in consciousness in connection with our interests; it is a fact of the most ordinary experience that a very slight stimulus—sometimes the mere mention of a word—may create a mental turmoil that takes hours to subside. The fact that these interests are so sensitive to stimulation makes them in adult life the mainsprings of our action. The peculiarities of the attention process, which we consider below, renders it impossible for them to exist continuously in consciousness; but they do seem, in the form of psychological dispositions, to be, in metaphorical language, constantly pressing upon consciousness, and they enter it whenever there is a momentary vacuum, or when a faint stimulus adds to their strength.

This characteristic of theirs is the real reason why we are justified in holding ourselves and others responsible for ideo-motor action, for in normal life an idea will rarely have sufficient strength to bring about an act unless it is strengthened from within by the stirring of these interest-complexes which have been built up in us by education and experience.

The doctrine of Interest has been worked out more from the point of view of educational than of general psychology: see the heading "Interest (doctrine of, in education)," in Baldwin's *Dictionary;* also Hayward, *The Secret of Herbart.* Professors Stout and Baldwin define Interest as "the consciousness which accompanies mental tendencies of any sort, so far as they terminate upon mental objects or stimulate to the construction of them." Throughout our waking life, as long as we are (so to speak) mentally *alive,* we are interested in this or that. On interest as the *selective* function of consciousness, see Stout, *Analytic Psychology,* vol. i., bk. ii., ch. iii.; James, *Principles,* vol. i., pp. 284-290, 402-403, 572; vol. ii., pp. 344-345.

§ 8. *Attention.*—The moment we think of this process we perceive that it has a very wide range of intensity. When we play a game of chess, work out an algebraical problem, take the bat for our county at a cricket match, we are attentive for a considerable time in the very highest degree. When the struggle is over, we have a distinct pleasurable sensation of released tension. The ordinary man reserves the word attention for cases of mental concentration such as these, but nearly the whole of our waking life is characterised by some degree of attention even when it sinks to a mere awareness of what is going on. In this wider sense the word becomes synonymous with mental activity; and a state of inattention is realised only when we are dozing off to sleep or slowly waking.[1] Words may then fall upon our ears, but their sense penetrates not; for to understand words we must construct their meaning ourselves; our eyes if open are fixed on vacancy; a diffused feeling of bodily comfort is faintly sensed. This form of inattention is almost purely negative, and is very different from that of which we often complain in children. When we say to them, You are inattentive, we commonly mean, You are attending to the wrong thing.

It is a characteristic of attention that it always has an object. This object may be (*a*) intellectual, as when we follow a train of abstract thought, or (*b*) sensorial, as when we watch a pair of birds building their nest, or (*c*) a combination of the two, as in a game of chess: in this last case the object is the game as a constructed unity in our minds, but this ideal construction is continuously based upon and modified by the sense impressions derived from the chessmen. The easiest form of attention is found in *b*, the most difficult in *a*. In the next chapter it will be shown that these facts have an important educational bearing.

A second general characteristic of attention is that it cannot remain fixed on one object unless that object develops. If you fix your attention on the ticking of a clock, you will be surprised to note that the sound is now louder, now lower; it comes in waves or pulses. This phenomenon is due to what has been fitly called the oscillation of attention. When we listen to a monotonous discourse or read a book which does not interest us, the same thing happens; our attention wanders to other matters, and has to be recalled again and again. On the other hand, when the object develops in our minds—as when we work out a chess problem—we are not conscious of such oscillations; we seem capable of great and continuous concentration.[1]

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[1] Cf. what was said above on the subject of *Subconsciousness* (ch. iii., § 4).

Various attempts have been made to determine what has been called the span of attention, or to answer the question—To how many things can we attend at once? Thus some observers have sought to discover the number of things which can be distinguished by a single glance; for example, "Cards were ruled with short lines, varying in number from four to fifteen, and exposed to the eye for a hundredth of a second. When the number was but four or five, no mistakes as a rule were made. For higher numbers the tendency was to under- rather than to over-estimate. Similar experiments were tried with letters and figures, and gave the same result. When the letters formed familiar words, three times as many of them could be named as when their combination was meaningless. If the words formed a sentence, twice as many of them could be caught as when they had no connection."[2] Here, however, the so-called objects are all related as units in one total,—hence are clearly apprehended by a single act of attention. The experiment reveals not any shortcoming of attention, but the limitation of the sense organ. Other observers have tried the experiment of carrying on two processes at once,—for instance, writing one poem while reciting another. This device bears more nearly upon the question under discussion; but even here the two processes appear to be carried on not by a division of attention, but by its swift transference from one to the other. Thus the hand needs guidance at the beginnings of the words or phrases; neural habit then enables it to continue unguided for a moment; and the same is the case with the voice. Should both need guidance at the same moment, one process or the other ceases. If the reader will but try one or two such experiments for himself, he will, we think, be convinced of the essential unity of the attention process. Would it be possible for any of us to solve an intricate geometrical problem and think out a theory of causation at one and the same time? Of course it is possible to conceive of beings able to follow simultaneously several chains of close reasoning and able to reproduce each in its entirety,—just as we are able to hear simultaneously several distinct series of sounds (such as the howling of the wind, the singing of a kettle, the sweeping of a floor, the rush of a river) and keep each as a separate series in our mind. But man's consciousness is not of this kind, and it appears to be the truth that when attention is at its height it is limited to one object.[1] This view of attention is supported by the well-known fact that concentration on one object implies the withdrawal of attention from others. Even severe pain may entirely disappear when we are deeply interested in something else.

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[1] On the "focus" and "margin" of consciousness, see ch. iii., § 3.

[2] Experiments by Mr J. M. Cattell, quoted by James, *Principles of Psychology*, vol. i. p. 407.

Different varieties of Attention have been distinguished. These are—(1) Volitional, as in all cases where we are conscious of effort or difficulty. In such cases attention seems to consist in a series of endeavours to fix our mind on some topic which does not *in itself* interest us; our thoughts wander from it, and have to be constantly recalled. This process cannot be continued for long; unless our thought becomes tangled in the developments of the topic itself, and is borne along with it instead of constantly starting away from it, we shall do no profitable work. "There are topics known to every man from which he shies like a frightened horse, and which to get a glimpse of is to shun. Such are his ebbing assets to the spendthrift in full career. But why single out the spendthrift when to every man actuated by passion the thought of interests which negate the passion can hardly for more than a fleeting instant stay before the mind? It is like *memento mori* in the heyday of the pride of life. Nature rises at such suggestions, and excludes them from the view. How long, O healthy reader, can you now continue thinking of your tomb? In milder instances the difficulty is as great, especially when the brain is fagged. One snatches at any and every passing pretext, no matter how trivial or external, to escape from the odiousness of the matter in hand. I know a person, for example, who will poke the fire, set chairs straight, pick dust-specks from the floor, arrange his table, snatch up the newspaper, take down any book which catches his eye, trim his nails, waste the morning *anyhow*, in short, and all without premeditation,—simply because the only thing he ought to attend to is the preparation of a noonday lesson in formal logic which he detests. Anything but that!"[1]

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[1] Of course the object is often very complex, as when we consider the state of the army or the situation in the Far East: the point to be insisted upon is that for the mind regarding it the object is one whole.

Contrasted with this Volitional Attention is (2) Spontaneous or Passive Attention. This again may be either (*a*) Derived or (*b*) Immediate. It is immediate when the object, whether it is a train of ideas or a sense stimulus, in itself commands attention; derived when the object is interesting, simply because of its connection with other things that are so. In adult life the two species are usually mingled; thus in watching a play, the bright colours, the movement of the actors, the changes of scene, all arouse immediate attention; the comparison of the actors with others we have seen gives rise to derived attention. Volitional attention is always derived; for the very fact that effort is present is proof that the object is not interesting in itself, nevertheless it may and frequently does pass into spontaneous and even immediate attention, for the object may become interesting in its own right.

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[1] James, *Principles of Psychology*, vol. i. p. 421.

In considering the span of attention, we noticed in passing one remarkable result of its limitation, namely, that when attention is strongly concentrated on one thing, others that would ordinarily attract our notice pass unrecognised. In other words, the threshold of attention is raised, so that a stronger stimulus than usual is required to reach consciousness. Thus many people can read or write in the midst of a hum of conversation and not hear a word of it. A second remarkable effect of attention is the shortening of "reaction-time," or the time taken to respond to a stimulus. In games of skill, such as tennis, we all know the effect of being "off our guard"; we are slow in response and miss our stroke. We may even note that our play is better if we keep our mind fixed on our own reactions rather than on the course of the ball. That these differences in speed do actually exist has been proved by Wundt and others. Thus in one series of experiments in which the signal was the sound made by a ball falling on a board, the average reaction-time was .253 seconds, whereas when the release of the ball was so arranged as to give a warning signal the time sank to .076 seconds. In some subjects any distracting sensation, such as the playing of an organ in the room where the experiments are being carried on, lengthens reaction-time. When the attention is directed to the response rather than to the signal, reaction-time is often (not always) shorter; and this even when an intellectual element is involved, as when the stimulus is variable and the experimenter has to vary his response accordingly.[1]

Whether the reaction-time is shortened or not, appears to depend on the individual. Dr Farrand, of Columbia University, in November 1896 examined two well-known pianists, Rosenthal and Sieveking, with a view to testing their reaction-time to sounds. Rosenthal, when asked regarding his attention, stated that it was entirely on the signal, and doubted if he could hold it on the reacting muscle. When he tried to do so the time of the reaction more than doubled, and the average variation in time more than quadrupled. Sieveking, on the contrary, maintained that his attention was fixed entirely on the reacting hand: when asked to fix it on the signal he soon declared it impossible, and declined to proceed. Professor Baldwin gives it as his opinion that so much evidence has now accumulated that the existence of types of simple reaction can no longer be ignored by any one.[2]

By attention the current of life is thus quickened, and this quickening is due to a preparation from within of the centres which are to give the response. They are kept in a state of subdued excitation, as are also the muscles themselves which are about to be used. This "preperception," as ideational preparation has been called, often has important perceptual results; for example, when a child, primed with ghost stories, enters a room in the dark any white drapery will, down to the minutest detail, become the figure he dreads.

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[1] Thus Münsterberg made a series of experiments in which the reactor had to respond with a particular finger, according as a poet, a philosopher, a statesman, &c., was named. For an account of these experiments, see James, *Principles*, vol. ii. pp. 405-415.

[2] *Psychological Review*, vol. iv. p. 297. For a further account of other influences which affect reaction-time, see James, *Principles*, vol. i. pp. 85-97; Foster, *Text-book of Physiology*, pp. 1120-1124.

On the general psychology of Attention, see James,* *Text-book of Psychology*, ch. xiii. (also ch. xi., p. 170, on connection of attention with Interest; and ch. xxvi., p. 450, on connection with volition), and Stout,* *Manual*, bk. i., ch. i., § 4; bk. iii., ch. i., § 3; bk. iv., ch. x., § 11. These views are set forth in greater detail in James, *Principles*, vol. i., ch. xi.; vol. ii., ch. xxvi.; and Stout, *Analytic Psychology*, vol. i., bk. ii., ch. ii., iii. Ward, *Ency. Brit.*, art. "Psychology," widens the meaning of the word "attention" so as to make it coextensive with mental life,—an extremely wide usage which has not found favour with other writers; but this does not affect the truth of his fundamental view that *the subject is essentially active in being conscious of presentations.* F. H. Bradley (*Mind*, O.S., vol. xi., pp. 305ff), in an important article "Is there any Special Activity of Attention?" eliminates the factor of attention as *activity*, and resolves the experience of intensifying attention into a group of sensational and ideational elements. In this he carries on the tradition of the empirical school in psychology. This general view will come under criticism in the sequel (below, ch. vii., § 10); cf. also the article "Attention" in Baldwin's *Dictionary*.

On the "area of attention," and the relation of simultaneous to successive attention, an early but still suggestive discussion will be found in Hamilton, *Lectures on Metaphysics*, lects. xiii., xiv.; more recent work in James, vol. i. pp. 405ff.; cf. also the article "Attention, experiments on," in Baldwin's *Dictionary*.

For an account of the Herbartian explanation of Attention, as consisting of the interaction of presentations, see Professor Stout's articles in *Mind*, O.S., vol. xiii.

§ 9. Closely allied to interest is *Desire*. In adult life desire is sometimes experienced in a curious elementary form. We have an ill-defined sensation of want, a vague or blind craving,—blind because we do not know *what* we want. We say we wish something would happen; we sometimes take food or exercise or rest, but we do not *know* that we want any of these things; our efforts are merely experimental. The state is possibly due to fatigue or to over-stimulation of the nervous centres; but its importance to us at present is that it serves to illustrate the primitive form of desire. An analogous craving, though different in origin, seems to exist in infants; it is the need of the sense organs and the muscles to be used, to be stimulated. In its more developed forms desire is always connected with an end. We shall be led in the next chapter to lay stress on growth as a fundamental characteristic of the human self: our interests are in their nature incomplete or unsatisfied, our bodily needs are recurrent, pleasures which are continuous pall, and may even become painful (*e.g.*, a never-changing blue sky), and it is out of this sense of incompleteness that there arises desire.

Desire is a striving towards, aversion, its negative correlate, a striving away from; desire refers to the future, aversion commonly to the present; both generally cease with the attainment of their ends. If the end of desire is a certain state, then with the attainment of the state desire appears to cease; yet the displeasure felt at an interruption will often reveal to us that in the form of felt tendency it was still strongly present. An example will make this clear. During the latter part of a long walk we may eagerly look forward to the pleasures of rest; when we throw ourselves down on a sofa, we cease to be aware of any longing, and give ourselves wholly up to enjoyment, but if we are summoned to do anything we at once become conscious that desire is still present in the shape of an undefined longing for the continuance of our pleasurable state.

Professor Stout identifies aversion with enforced attention. The dislike which many people have to noise is an obvious example. In the obstruction of a process of thought or of action, which is moving in accordance with our wishes, either by an incompatible idea or by a physical obstacle, we have an analogous experience. The dislike felt for the unwelcome suggestion is often extended to the person making it, as when King Lear's anger flames up against Kent for seeking to stop him in his headstrong course. In such cases the enforcement of attention is due to the fact that there is a process actually going on in the mind which is impeded. Thus to go back to James's words quoted above, you refuse to contemplate your tomb because you view it as the terminus of your many lines of activity. When these are not dominant in your mind, it is quite possible for you actually to enjoy such contemplation as you dwell on the pleasing sorrow of your friends. In China a coffin is regarded as a very pleasing and appropriate birthday gift.

The question has often been raised whether we feel desire for certain things and aversion for others because we represent them as pleasurable and painful respectively; in other words, whether pleasure and pain are the exclusive determining factors of our desires and aversions. It is evident that in adult life the element of personal pleasure in the end desired sinks almost entirely into the background. The fact that pleasure does generally accompany the end desired is no proof that it was for that pleasure that we made it an end. Indeed the very perception that we have accomplished what we set ourselves to do itself gives rise to pleasure; but it would be absurd to say that it was for the sake of this pleasure that we set ourselves the task.

In giving references for further study of the topic of Desire, we shall also discuss the meanings of some related terms. This is one of the cases referred to by Sidgwick (*Political Economy*, pp. 49, 50,) where we seem to be merely discussing the meanings of words but are really increasing our knowledge of facts.

The vague want referred to at the beginning of the section is best designated a *need;* a tendency, more or less deep-seated, requiring satisfaction and painful or depressing if unsatisfied. Needs are often subconscious motives, influencing action but not rising to the level of conscious ends. Needs may be constitutional, natural, or "innate"; or they may be acquired by the individual. They are either mental or bodily. (*a*) Many natural or acquired *mental needs* are of the type of what we shall call sentiments or emotional dispositions (see ch. ix., § 3) when these become active tendencies. (*b*) *Bodily needs* are also called *appetites.* The craving for alcoholic stimulants is a case of an *acquired* appetite. Professors Stout and Baldwin describe "appetite" as follows: "It is distinguished from instinct, in that it . . . does not wait for an external stimulus, but appears [of itself in the life of the organism] and craves satisfaction. The *movements*, however, by which an appetite is gratified are mostly reflex and instinctive. For example, the child has the imperfect instinct of sucking to satisfy the appetite for food. Appetite is not *equivalent* to 'impulse,' in that the organic process is well defined and deep-seated, and is only to a very limited degree subject to voluntary control or modification. The appetites generally recognised are those of hunger, thirst, and sex; yet the need of air, the need of exercise, and the need of sleep come under the definition" (*Dictionary*, vol. i. p. 62). An appetite unsatisfied appears as an organic sensation (ch. viii., § 1), a state of vague unrest, involving (when satisfaction is deferred) painful sensations more or less definitely localised. Normally, deferred satisfaction gives rise to definite ideas of the object which will satisfy.

Though appetite is not identical with impulse, it is an instance of *impulsive* as contrasted with *deliberate* action. A deliberate act is one which is consciously brought into connection with some general plan or purpose (cf. § 3, above) by which the impulses are controlled. An impulse is an isolated prompting. Among human beings, impulses pure and simple are best seen in cases of mental disorder. The craving for drink or opium may take the form of an irresistible impulse. In the case of the lower animals, whose mental life does not generally rise above the level of perception, action is impulsive. The feelings and acts which take place are prompted by perceptions, and hence are not connected into conscious, general plans of action. The formation of such purposes requires a considerable development of the ideational life.

In *desire*, in the strict sense of the word, we have an idea of the purpose to be realised and ideas of the means. Professor Ward has brought this out very clearly. "The cases in which we are incited to action by ideas, as distinct from perceptions, are cases of desire. . . . By the time that ideas are sufficiently self-sustaining, they form trains that are not wholly shaped by the circumstances of the present; entirely new possibilities of action are opened up. We can desire to live again through experiences of which there is nothing actually present to remind us; and we can desire a new experience which as yet we only imagine" (art. "Psychology," *Ency. Brit.*, vol. xx. pp. 73, 74). See also Stout, *Analytic Psychology*, vol i., bk. i., ch. vi. (on the relation of pleasure and pain to the active element in desire and aversion, see below, ch. x.) Green, *Prolegomena to Ethics*, bk. ii., ch. ii., expounds the view that desires are forms in which the self tends to realise itself—*i.e.*, in which its general process of growth tends to take definite shape. On the relation of pleasure to the object of desire, see Sidgwick, *Methods of Ethics*, bk. i., ch. iv.

CHAPTER VII.

THE ORIGIN AND GROWTH OF MENTAL ACTIVITY IN THE INDIVIDUAL.

§ 1. *Pre-volitional movements:* (a) *random and reflex.*—When a child is born, its heart beats and its blood courses through its veins, its lungs move regularly, and many reflexes—such as the contraction of the pupil of the eye to light, swallowing, hiccoughing, &c.—are already established. Its limbs move, its head rolls about, its eyes open and shut. But the child cannot make a single movement voluntarily. An examination of an infant's brain, in which the higher brain cells—those which function in voluntary action—are undeveloped, would itself prove this. *A priori* considerations also convince us of the fact, for will—as we have seen—involves knowledge of an end: and how can the infant, new to earth and sky, have any idea of an end? Still, random movements—*i.e.*, movements initiated by an automatic action of the centres not involving consciousness,—as they have been called, do occur, and the child grows: grows physically by means of the food supplied to it, grows mentally by aid of the host of stimuli—light, heat, sound, contact—which are ceaselessly beating on its sensitive nerve-endings, and seeking an entrance into consciousness.

As there is a craving for food, so there seems to be a craving for sense stimulation, and for muscular movement. An infant has been observed to follow a light with its eyes as early as the twenty-third day. Discrimination gradually arises, pleasure in colours and in musical sounds is shown. Actions appear which seem to be instinctive in origin—*i.e.*, they have a purpose, but their purpose is not foreseen by the child. Such are seizing, sitting up, standing, walking. In such movements the characteristic habits of the race assert themselves.

Many writers regard reflexes as the primitive type of all action—as that from which all movement is developed. With a view to understanding more clearly the genesis of voluntary action, let us then examine this more closely. A reflex act may be defined as a specific response which invariably follows a specific stimulus: thus, when a frog's foot is touched with acid, the muscles of the leg contract; when food is placed in a dog's mouth, saliva is excreted. By a very recent series of researches,[1] Professor Pawlow of St Petersburg has distinguished what he calls "conditioned reflexes"; and as his conclusions seem to throw a very interesting light on the functioning of the central nervous system, we shall give a brief *résumé* of them here.

The animals studied were dogs in normal condition, and the specific reflex considered was the action of the salivary glands. The unconditioned stimulus—*i.e.*, the stimulus which invariably brings about the excretion of the saliva—is the placing of food in the animal's mouth. It was, however, known that other stimuli, such as the sight or the smell of food, sometimes brought about the same reaction. Such a stimulus Professor

[1] *The Lancet*, Oct. 6, 1906.

Pawlow called a conditioned stimulus, and he set out to determine its laws.

He found that a conditioned stimulus ceases to bring about the reflex, when it has been made to act a number of times without being accompanied by the unconditioned stimulus. Moreover, the shorter the interval between such repetitions, the more quickly is the reflex obliterated. It usually recovers spontaneously after one, two, or more hours, but it may be completely destroyed by a sufficiently prolonged series of repetitions: thus, if a certain kind of food is shown to a dog, without being given to him to eat, for some days or weeks continuously, then it loses its power of acting on the salivary glands through the medium of the eye or nose. But we can restore any conditioned reflex which has been obliterated, simply by allowing it to act once more in conjunction with the unconditioned reflex.

When these facts had been ascertained, obviously the next step was to try whether it was possible to manufacture conditioned reflexes. Here the most striking success crowned the efforts of the experimenters. The method pursued was simply to let any sensory stimulus whatever, such as the ringing of a bell, the application of heat or cold to the skin, the shining of an electric light, act for a number of times invariably along with the unconditioned reflex: for example, whenever food was placed in the dog's mouth (unconditioned stimulus), a certain note on the piano was struck (stimulus selected to be converted into a conditioned stimulus); it was found that after thirty, forty, or more repetitions, the conditioned stimulus (the striking of the note) would of itself bring about the flow of saliva.

This ready power of constructing reflex arcs shows the marvellous adaptability of the organism to its environment. Consider for a moment what must happen. The sensory excitement M, starting from the mouth, brings into action the neural elements N, which in their turn, by means of the motor nerves, bring about the action of the salivary glands G. The sensory excitement E, starting from the ear, is, by reason of the increased sensitiveness of N, drawn aside from its normal route to the higher nervous centres towards N, and so helps to promote the action of G.[1] When E is subsequently allowed to act alone, it is not drawn aside from its normal course by any increased sensitiveness of N, but a habit of travelling by N has been established, nor can this habit be broken all at once. The return of E to its normal course (*i.e.*, not passing through N, and therefore not giving rise to the reflex) is apparently analogous to the settling back into equilibrium of a system which has been disturbed (*e.g.*, a "rocking stone or a pendulum").

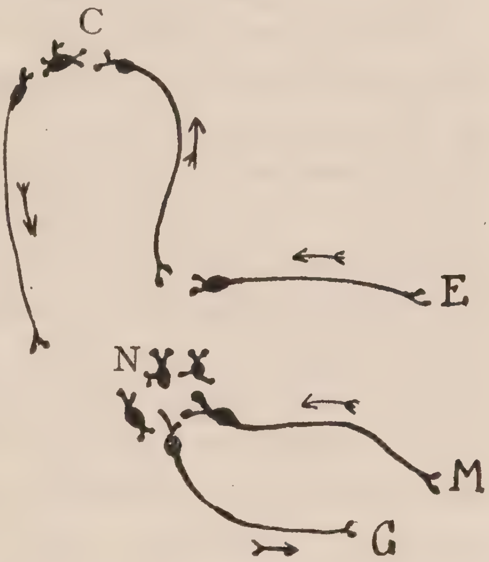

Fig. 4.
C, higher centres.

In the course of this investigation Professor Pawlow has furnished us with a proof of the extreme fineness of discrimination belonging to the nervous system, which is of sufficient interest and importance to be recorded here. He tells us that when the sound of a certain note has been established as a conditioned stimulus, notes which differ from it by so little as a quarter of a tone will often fail to give the response.

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[1] Both stimuli, of course, produce effects also in the higher levels of the brain, but we do not pause to consider them now,

Now we may safely regard the nervous system of the human infant as no less sensitive and no less liable to form conditioned reflexes than that of the dog. Hence movements are multiplied, and sensations derived from these movements, in ever-increasing numbers, press upward to the higher levels of the brain. It is unquestioned that those motor sensations play an important part in the development of volitional activity. The "traces" which they leave in the cortex correspond to motor memories, and render possible ideas of movement; and we may regard it as self-evident that a voluntary movement cannot take place unless the idea of that movement is in the mind, for all volition, as we have seen, involves the idea of its end.

§ 2. *Motor sensations.*—Two questions arise with respect to motor sensations: (1) from what parts of the body do they come, and (2) how is the cortical activity concomitant with the presence of the idea of the movement in the mind brought into connection, by means of the motor nerves, with the muscular apparatus concerned?

(1) When a baby stretches its hand towards an object, it sees the movement; when it laughs or cries, it hears its own voice. All these *remote* effects of movement, as Professor James calls them, go to form motor memories. But we *feel* the movement of a limb even when we do not see it. We never fail to know in what position our arm is, even if it is moved by some other person, our eyes being shut. This

knowledge comes to us by way of sensory nerves which have their endings in the muscles, tendons, articular surfaces, skin, and ligaments, and to this region the sensations are referred by consciousness. These *resident* effects of movement are termed "kinæsthetic" sensations. Usually we pay no attention to them, because as sensations they are of no importance; it is only their *meaning* that matters. If the reader will stretch out his arm, shut his eyes, and slowly bend his elbow-joint, paying careful attention to the manner in which he is aware of the direction, velocity, and duration of the movement, he will realise the nature of kinæsthetic sensations. If he continues this movement, endeavouring to make the lower arm press on the upper as closely as possible, he will perceive that the sensations localised in the muscle grow painful. As a second experiment, let him endeavour to lift a weight which is too heavy for him. Are the sensations of effort which he now experiences purely kinæsthetic, or does he have direct knowledge of the amount of energy he is sending forth from the centres? Bain chose the latter of these alternatives, believing that our muscular sensations are the immediate result of the cerebral initiation of an efferent nerve-current, and vary with the intensity of that current. This hypothesis is known as the *Central Innervation Theory.* There is nowadays no question but that most of our sensations of movement do come by way of sensory nerves, and are thus on a par with other sensations. The only living form of the question is this—Have we any direct knowledge of our own activity as a process, apart from incoming sensations and memories of past sensations? In this form the point will be again dealt with in § 10.

(2) We turn now to the second question regarding motor sensations. It may be expressed thus: If ideas of movement result solely from incoming sensations, how is the connection established which enables them to act as starting-points for the efferent currents of nervous energy which bring about that particular movement? The difficulty is that in non-voluntary movements the sensations are the termination of the process, whereas in voluntary movement they are the beginning. Professor Pawlow's experiments on "conditioned" reflexes have shown us that the path of the nervous current is affected by the contemporaneous excitement of unconnected nervous elements. In a further series of experiments he tried to produce conditioned reflexes by traces or latent remnants of an unconditioned stimulus. That is to say, "the conditioned stimulus was not brought into action until the unconditioned reflex was at an end." In these cases also the conditioned reflex was developed. Now, when we consider kinæsthetic sensations, do we not find a close parallel with the state of matters necessary for the development of a conditioned reflex? Professor Pawlow, in establishing the conditioned reflex, after every occurrence of the unconditioned one, brought into action a definite stimulus which produced a definite state of the centres. After this had been done a certain number of times, a connection was established by which his arbitrarily-selected stimulus, acting by itself, brought about the reflex studied. Now, in the case of muscular action, we have a definite state of the centres (kinæsthetic sensations) invariably occurring just after any reflex has taken place. In accordance with the law of the conditioned reflex, then, a connection will establish itself by which the cortical excitement,

accompanying the idea of the movement, will pass along the motor nerves in such a way as to bring about the movement. In this way actions, prompted by motor ideas, may first take place as conditioned reflexes; and thus, when the self becomes capable of volitional activity, it will find paths, connecting the motor ideas with the actual movements, definitely laid down for it.

The reader must not, of course, attach too much importance to the foregoing hypothesis. Our knowledge of the nature of the development of voluntary movement from the physiological side is still very vague. The experiments of Professor Pawlow show the kind of work which is at present being done in order to render this knowledge more definite. There can, indeed, be little doubt but that conditioned reflexes do play a considerable part in the genesis of voluntary movement; but we cannot yet say with certainty exactly what that part is.

The "kinæsthetic sensations" referred to in the former half of the foregoing section undoubtedly follow on *afferent* nerve-processes. Sensory nerves go to the skin, and are stimulated by the stretchings and overlappings of the skin which accompany movements of the limbs; sensory nerves also go to the tendons, the surfaces of the joints, and (in many cases) to the muscles themselves. The "sense of innervation" is a mode of consciousness having the characteristics of actual sensation, supposed to accompany the discharge of an *efferent* nerve-current from the motor centres of the brain, and to vary in intensity with the intensity of the outgoing current (see Bain, *Senses and Intellect*, last edition, p. 76; Mach, *Die Bewegungsempfindungen;* and the headings "Effort, bodily," and "Innervation," in Baldwin's *Dictionary*). Stout,* *Manual*, bk. ii., ch. vi., § 3; and James, *Text-book*,* ch. xxvi. (p. 418), and *Principles*, vol. ii. pp. 189ff, 494ff, criticise the innervation theory, which is also rejected by Münsterberg, *Willenshandlung*, pp. 78ff, Bastian, *Brain as Organ of Mind* (Appendix), and others. See § 10, below.

§ 3. *Pre-volitional movements:* (b) *instinctive.*—It is, I suppose, generally agreed that if an infant were kept from birth in the dark, the power to see would not develop. When a child is blind from birth the sight centres of the brain do not follow the normal course of development. It must not be thought that a child is born into a world of colour, space, sound, and movement such as forms our environment. Although at birth his eyes are open, he sees little if any more than a newly-born kitten, and for some hours or even days he is deaf. The development of any of our senses only follows upon the continuous beating on its end organ of sense stimuli—*e.g.*, rays of light in the case of the eye. In precisely the same way the higher centres of the brain are roused to action by the pouring in of stimuli propagated from the lower centres, whence they may possibly already have produced one outward effect in the shape of reflex action. Innumerable sensori-motor arcs or sensation reflexes are thus formed as the power of discrimination grows. This development of sensibility is the fundamental psychological mystery; the fact that as time passes the child comes to respond to rays of light of different wave-lengths by definite sensations of colour is for psychology a basal fact beyond which it does not pretend to go. The sensations which thus gradually appear as typical reactions of the mind in response to physical stimuli are, so far as we can judge, approximately the same for all mankind. Movements may be viewed in the same way as simply reactions on the environment, and some of them (reflexes) are, as we have seen, as inevitable as sensations. And even this is not all; modes of thought are also inevitable reactions—*i.e.*, no human being is accounted normal who does not come to have certain ways of thinking in which he resembles other normal human beings. Thus a proposition of Euclid is as convincing to a child when he is old enough to understand it as it is to you and me. That is to say, in the space-world which he has gradually come to recognise as existing around him all Euclid's theorems are implicit; just as the brilliancy and variety of all the colours of the spectrum were implicit in the first vague mental stir which arose when rays of light first fell upon his new-born eyes. And as modes of thinking are thus implicit in the child's mind, so are modes of action, or, perhaps better, modes of feeling which prompt to action. To such modes of feeling Professor James extends the term Instinct, and in his wonderfully suggestive chapter under this heading he gives a long list of human instincts.

In the case of animals, purely instinctive acts are distinguished from reflexes only by their greater complexity. Except in origin they do not differ from automatic trains of action in man which have become stereotyped by habit, and these, as we have seen, seem to be guided throughout their course by successive sense stimuli (p. 123). The following passage, quoted by Professor James from *Der Thierische Wille*, by G. H. Schneider, will elucidate this point: "When the burying beetle perceives a carrion, she is not only impelled to approach it and lodge her eggs in it, but also to go through the movements requisite for burying it; just as a bird who sees his hen-bird is impelled to caress her, to strut around her, dance before her, or in some other way to woo her; just as a tiger when he sees an antelope is impelled to stalk it, to pounce upon it, and to strangle it. When the tailor-bee cuts out pieces of rose-leaf, bends them, carries them into a caterpillar- or mouse-hole in trees or in the earth, covers their seams again with other pieces, and so makes a thimble-shaped case, when she fills this with honey and lays an egg in it, all these various appropriate expressions of her will are to be explained by supposing that at the time when the eggs are ripe within her the appearance of a suitable caterpillar- or mouse-hole and the perception of rose-leaves are so correlated in the insect with the several impulses in question, that the performance follows as a matter of course when the perceptions take place."

In the case of the higher animals we may suppose that few habits instinctive in origin fail to be much modified by memory and intelligence. In man these all-important factors come into play so soon that acts instinctive in origin have no chance of becoming stereotyped unless they are very simple and necessary. The following are examples of such simple instinctive acts: they differ from the pure reflexes in this, that they all become subject to the command of the will.[1]

ACT.	STIMULUS.
Biting.	Object placed in mouth.
Licking.	Sugar held to tongue.
Clasping and carrying to mouth.	Object touching hand (or foot).
Smiling.	Various gentle stimuli, such as fondling.
Crying.	Over violent stimuli, solitude, hunger, &c.
Holding head erect.	Seems to occur spontaneously with the maturing of the nerve-centres concerned.
Vocalisation.	Ditto.

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[1] This statement is not meant to imply that the will has no influence on the reflexes; it may both further and hinder them to some extent, but very few if any of them can it entirely control.

ACT.	STIMULUS.
Sitting up.	Seems to occur spontaneously with the maturing of the nerve-centres concerned.
Standing.	Ditto.
Locomotion.	Ditto. The feet being placed on the ground will often act as a stimulus, bringing about the movements required for locomotion before the legs are strong enough to support the weight of the body.

A glance over this list will convince the reader of two things: 1. Even allowing that we cannot call these acts purposeful on the part of the child, yet each of them leads to a great deal. 2. They appear at different times: for instance, the impulse to creep or walk is dormant during the first few months, and may arise quite suddenly without there being any change in the environment to account for it. That a pure instinct may be dormant at birth, and yet when the time is ripe may show itself in perfected action, is shown by the fact that birds kept in confinement for a few weeks after birth fly with a precision in no way different from their elders. It would seem, then, that an instinct may arise at any time during the period of growth. But if it arises late it stands little chance of ever attaining to its full development, because it will so quickly be modified by intelligence—which may, indeed, even inhibit its inception altogether.

The other modes of reaction classed by James as instincts are not, like those given above, definite responses to more or less definite stimuli. They embrace practically all the infinite variety of complex activity of which man is capable. Their claim to rank as instincts is that they are modes of action prompted by definite modes of feeling which arise spontaneously in every human being. Such a classification can be made by a man only because he *is* a man, and himself knows the inner experience which starts the act. The classification given above might have been made by an outside spectator possessing none of the feelings of a man; but no such outside spectator could hope to reduce the apparently chaotic and infinitely varied combinations of movements included below to even the semblance of order afforded us by this classification.

We arrange them according as the Intellectual, the Active, or the Emotional aspect of our nature appears most prominent; but it is needless to remind the reader that all three aspects can be distinguished in them all.[1]

INTELLECTUAL.	ACTIVE.	EMOTIONAL.
Curiosity.	Imitation.	Anger.
	Hunting.	Fear.
	Acquisitiveness.	Love.
	Constructiveness.	Hate.
	Play.	Joy.
	Cleanliness.	Grief.
	Secretiveness.	Shame.
	Emulation.	Pride.
		Modesty.
		Sociability.
		Sympathy.
		Jealousy.

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[1] The fundamental human tendencies to find satisfaction in Truth, Beauty, and Goodness are also *instinctive* in the same sense; cf. ch. viii., §§ 11, 12.

In a large proportion of these instincts it will be seen the conative aspect is dominant; in all of them it is evident, since all of them clearly prompt to action of some sort. Those which have been selected as in a special degree active or conative have been so selected as indicating love of power, of self-expression. It is clear also that though only one instinct appears in which the cognitive aspect can conceivably be regarded as dominant, yet Fear, Love, Acquisitiveness, and all the rest imply an object—something we fear, something we love or desire, something we hunt or acquire,—that is, the cognitive aspect is an integral part of the instinct itself. In a normal child whose environment is as it should be, all these instincts will spring up during the first few years of life, some being more prominent at one period, some at another.

§ 4. *Instincts as transitory and as indeterminate.*—A study of Instinct in the animal world makes plain two points which are of great importance to the educator. The first of these is that *instincts are transitory.* In illustration of this we quote the following observation of Mr Spaulding's. When chicks first emerge from the egg they "will follow any moving object. And when guided by sight alone, they seem to have no more disposition to follow a hen than to follow a duck or a human being. Unreflecting lookers-on, when they saw chickens a day old running after me and older ones following me for miles and answering to my whistle, imagined that I must have some occult power over the creatures; whereas I had simply allowed them to follow me from the first. There is the instinct to follow, and the ear, prior to experience, attaches them to the right object." But of three chickens which were kept hooded until nearly four days old, each, when unhooded, "evinced the greatest terror to me—dashing off in the opposite direction whenever I sought to approach it. The table on which they were unhooded stood before a window, and each in its turn beat against the window like a wild bird. One of them darted behind some books and, squeezing itself into a corner, remained cowering for a length of time. . . . Whatever might have been the meaning of this marked change in their mental constitution—had they been unhooded on the previous day they would have run to me instead of from me—it could not have been the effect of experience; it must have resulted wholly from changes in their own organisations."[1]

The chicks' early instinct of running towards a moving object has engendered a habit of seeking their mother, and this habit, be it observed, is not endangered when the contrary instinct arises. Mr Spaulding's second set of chicks would be "misanthropes" all their days, because when their friendly instinct was active it was allowed no scope. In the same way it is possible permanently to impoverish a child's nature by not giving him opportunities at the right time. The chick's first instinct has served its purpose when it has created a habit of following the mother; similarly each of the child's instincts should be made to act as the foundation of a habit. Thus the instinct of curiosity may serve as base for the habit of desiring knowledge, that of constructiveness for a habit of clear thinking, that of secretiveness for a habit of seemly reserve, that of imitation for habits of good manners, correct modes of speech, and so on.

Another lesson which the story of the chicks teaches us is that *the object which satisfies the instinct is inde-*

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[1] Quoted from James, *op. cit.*, vol. ii. p. 396.

terminate; its determination depends in some degree (how much we as yet know not) on the educator. The difference between an arrant gossip and a man of science is to some extent a difference in the directions of their flaming curiosity. Moreover, the pleasure associated with the gratification of the instinct is transferred, as the latter becomes transformed into a habit, to the object towards which the instinct was directed. To take one example: if a child's hunting instinct is allowed to find satisfaction only in the playground, the interest-complex founded upon it will be concerned only with sport, and the pleasure which the gratification of his instinct has given him will be transferred by him to the world of sport; but it is not difficult by the exercise of a little ingenuity to direct this instinct on objects intellectual, and so form interest-complexes of such a nature that they will give scope to the highest powers that the mind can develop.

The instinctive tendencies in the human being are described and discussed by Bain, *Mental and Moral Science,* bk. i., ch. iv.; Preyer, *The Mind of the Child;* and James, *Text-book,* ch. xxv.; *Principles,* vol. ii., ch. xxiv., where the term "instinct" is extended to signify native endowment of any kind, common to a group of individuals. In the biological sense an instinct is an inherited tendency to perform, at certain periods or under the stimulus of certain circumstances, a comparatively complex series of actions, purposive in character, but without consciousness of what the purpose is—*e.g.*, the nest-building of birds. *Reflex* acts, on the other hand, are comparatively simple, and not always evidently purposive. Instincts, moreover, are associated with the stimulation of nerve-centres of level not lower than the sensory centres. It must be observed that though an instinctive action is done without consciousness of its final purpose, the performance of it may involve a high degree of consciousness and attention.

On the *origin oj instinct* (a problem of psycho-physical evolution) see Baldwin's *Story of the Mind*, ch. iii.; and the heading "Instinct" in Baldwin's *Dictionary*.

§ 5. *Process of Learning.*—Reflex and instinctive acts have been acquired in the course of racial development; in their case the process of learning is not exemplified in the individual. But there are many modes of action which we do learn as individuals; and an analysis of the process is of value.

There are over four hundred muscles in the human body, so that the number of ways in which these may theoretically be combined reaches so high a figure that we may call it infinity. In the performance of any skilled movement it is not likely that the co-ordination of muscular movements required should result from chance. When we learn any new series of skilled movements, as when we begin golf or tennis or skating, our first imitations of the models presented to us (or of the "copy" possessed by our minds) are often very poor affairs. We give out far too much energy, we contract muscles which ought to be left slack, we let our muscles waste their power in opposing one another—as when the swing of our arms in using the golf-club tends to move us round, and our corporal muscles hold us rigid. A child learning to write grips his pen for dear life, stiffens his body, puts out his tongue, rolls his head from side to side. No wonder the writing lesson is an exhausting one! In early life the outpouring of energy seems to be almost miscellaneously directed, and the results are often very funny and most unexpected to the little living wills which are seeking to rule their environment. Thus two well-known students of baby-life, Mrs Hall and Miss Shinn, have both noted that on several occasions the effort to creep towards something resulted in a backward movement, so that the desired object, as in the looking-glass world, only got farther and farther away.

How does precision of movement result from this miscellaneous outflow of energy?

The following experiment on cats, made by Mr Thorndike, serves very well to illustrate the formation of a definite and purposive movement. He "confined hungry cats in cages closed by doors that would fall open when certain catches within the cages were pushed or pulled in certain directions, and food was put near by where it could be seen by the cats. The result commonly was that the cat persisted in clawing and scratching at the walls of the cage until it happened in the course of its random movements to push the catch and so escape. On being put through the experiment time after time in the same cage, under similar conditions, a cat usually repeated the same kind of random clawings and scratchings, but on successive occasions the time elapsing before the successful movement was made became less and less, until after a number of repetitions, varying from a small to a large number, the cat would perform the necessary movement at once every time that it was put into the cage."[1]

In this case the right movement is not selected and fixed by intelligence as might happen in the case of a child; but the fact that the time required by the cat to gain freedom grows progressively shorter, shows that some factor is at work which favours the right adaptation. Each movement of the animal may be regarded as resulting from the passage of the nervous energy along a sensori-motor arc: that is, the sight and touch stimuli aroused by the cage travel along the sensory nerves to the central nervous system, and thence descend the motor nerves and rouse the muscles to action. The formation of an unsuccessful sensori-motor arc tends to depress the amount of nervous energy available; whereas the formation of a successful one tends to increase it. This increase flows along the track which has just been formed, and by partially re-innervating it deepens it. Then when the cat is again put in the cage the successful movement is more closely associated with the part of the cage where the catch is than any other movement, and hence is likely to occur as soon as the cat turns its efforts in the right direction. In this way all successful lines of action are perpetuated, whereas unsuccessful ones are dropped.

In the case of a child in similar circumstances—say, shut up in a room — definite experiment, founded on previous experience, would take the place of the cat's wildly directed struggles.

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[1] Quoted from M'Dougall's *Physiological Psychology*, "Temple Primers," p. 146.

The child would, for instance, direct all his attention to the door, and probably to the handle and the lock; and his movements would be partially determined by his knowledge of the nature of door-fastenings. When he once found the secret he would reproduce the connection between sensation and movement either actually or in his mind, till the path was so deepened that the co-ordination would take place on the next occasion almost automatically. Children practise skilled movements in this way continually; a little girl who is learning to dance may be seen constantly breaking into fragments of the steps, and even when she is still she rehearses mentally the images of the movements. A piece of music may be studied to considerable advantage by placing it on the table before us and *thinking* the movements required. Here, although we do not actually move the fingers, we are forming partially the sensori-motor arcs connecting the appearance of the notes with the necessary movements, and so rendering the passage of the stimulus easier for the future. Each movement gives rise to a complex of kinæsthetic sensations, the excitement accompanying which tends to discharge forward into the muscles which have already made the movement. The visual sensation becomes associated with the kinæsthetic sensations, so that the two aid one another in producing the movement. The attention becomes more and more fixed upon the visual sensations and withdrawn from the kinæsthetic sensations, which seem almost to disappear from consciousness. But of the fact that they are still present, in so far that they have an appreciable effect upon our total state, we may assure ourselves by observing how immediately the attention is drawn towards them if any difference in them arises. Thus, if we inadvertently pick up and begin to play with a tennis racquet, of which the handle is a little thicker than that of the one we have been accustomed to use, the slight difference necessitated in the position of our fingers quickly makes itself felt as positive discomfort.

Let us now tabulate the different steps necessary for the acquisition of a skilled movement—for instance, the art of writing:—[1]

1. Presentation of copy.

2. (*a*) Acquisition by experiment and selection of series of resident kinæsthetic sensations required for reproducing the copy, and (*b*) acquisition of series of visual images of the work produced.

3. Combination of (*a*) and (*b*), which comes to take the place of the copy.

4. Control of the kinæsthetic series, seeming always to involve (*a*) attention to the series, (*b*) attention to the representation of the intended result as a whole; (*b*) is the controlling and dominant function. The process of writing has in most of us become secondarily automatic, so that we simply check the results by the visual images as we go along.

An interesting experimental investigation, by E. J. Swift, of the process of learning will be found in the *American Journal of Psychology*, vol. xiv. p. 201. The writer points out that learning may be roughly classified under three types: the acquisition of skill or learning to do; the formation of associations or the acquisition of knowledge; the acquisition of control or the formation of inhibitions. In accordance with this classification three researches were undertaken: (1) on tossing and catching balls, (2) on learning shorthand, (3) on the acquisition and control of the reflex wink. Regular records of progress were kept, and the results plotted in the form of curves. A few of the results of these investigations may be set down here.

(*a*) Fatigue lowers the day's score, and practice in such circumstances probably hinders the whole process of learning.

(*b*) Effort is unfavourable to the score, and prevents the learner even doing himself justice. Effort in this sense means the intrusion of elements of self-consciousness which have the effect of positively distracting the attention from the matter in hand.

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[1] For references relating to the interesting subject of the *psychology of handwriting*, see Baldwin's *Dictionary* under the heading "Handwriting."

(*c*) Progress is not uniform, but by fits and starts. When a long pause took place it was sometimes found to be due to the fact that the physiological limit of the method used had been attained, and further progress was possible only when a new method was adopted. It is at such moments that the suggestions of the teacher have their greatest value.

(*d*) In the ball-throwing experiments the attempt was made to obtain a curve of forgetting. After practice entirely ceased a trial was made every thirty days. The record obtained turned out to be a new record of learning: in two of the cases the gain in skill during the monthly tests was something remarkable. Bourdon, in a series of experiments on speed in associating French words with their English or German equivalents and *vice versa*, found that after intervals of thirty days and more not only did the effects of practice persist, but a positive gain in speed was apparent.[1] That many teachers have a practical acquaintance with this fact is shown by their habit of introducing a new subject to their pupils shortly before the holidays.

(*e*) Varieties of method seem to arise by chance, and the successful ones are selected and re-enforced by conscious attention.

The importance of these observations for practical pedagogy is obvious. One of the greatest needs of the science of education at the present time is a detailed study of the psychology of learning. We have little doubt that, owing to the general ignorance of the nature of this process, much of the time now spent by children in schools is wasted or worse than wasted.

§ 6. *Growth of interest.*—If the work that the educator seeks to do in forming the child is to have any stability, it must be broad-based upon his instincts, for instinct-prompted acts are essentially acts we desire to do; they are expressions of the self, and as such are always accompanied by interest (cf. p. 127). Interest as a feeling actually present in the mind arises in an adult, as we have seen, when his accepted ends seem likely to be furthered or hindered; in a child who has as yet not formed his ends the feeling of interest accompanies self-activity or, what in early years is the same thing, instinct-prompted action.

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[1] *Année Psychologique*, vol. viii. p. 334.

At this point we ought perhaps to allude to the distinction which has been drawn between Immediate and Derived Interest. This distinction is closely analogous to that which has already been noticed in the case of attention (p. 134). At first sight it appears not only obvious, but perfectly well defined. Thus a bright colour is immediately interesting to a child, while a low voice may not be. But if the low voice be its mother's, it becomes charged with a most pregnant interest, being associated with food and fondling and warmth, through which associations it rouses a derived interest far more lively than any immediate interest. It appears then that we have Derived Interest when the feeling is aroused by meaning, Immediate when it is aroused directly by the stimulus. To children sense stimuli have comparatively little meaning, because of their limited experience; whereas it is a matter of common observation that adults have usually become habituated to disregarding all stimuli except those which have become charged with a special meaning for them. Hence the commonplace that in children interest tends to be immediate, in adults mediate or derived.

But when we come to examine this distinction more closely it turns out to be of little scientific value; for instead of being a distinction of kind, it turns out to be one only of degree. For *meaning* is simply the interpretation of a stimulus according to the constitution of a particular mind. But it is the merest matter of fact that all stimuli are interpreted by the mind; colour and sound, for instance, as such, exist nowhere except in the interpreting mind. Either kind of interest then springs up with the mind's constructive activity, only in the one case the mind's work is greater, in the other less. In both cases, as we have seen, its power of reacting has developed gradually, and in fact derived interest is only a specific form of immediate interest.

The distinction is, however, of some practical importance. All adults have psychological dispositions or interest-complexes, which are roused by certain—often very faint—stimuli. They are apt to forget that their feeling of interest is due to their own mental excitation, and to regard the stimulus as interesting in itself. Thus they often blame their children or set them down as stupid, because they shrink from topics which rouse in themselves such lively feelings. In the same way a man with a hobby is often a bore. It is given to few to place themselves in the beginner's shoes, and give him a fair opportunity to form an interest-complex for himself.

Of late years much stress has been rightly laid on the necessity of basing education on a study of concrete objects, of teaching things before words. "Appeal to the senses" has been the constant cry of the educational reformer, and to this cry our educational authorities no longer turn a deaf ear. But we must not apply this rule blindly; we must be guided by the following psychological principles: (1) Any mental act is the product of two factors, one derived from the external world, the other from the mind itself; and all mental development consists in an alteration of the ratio these two factors bear to one another in favour of the latter. The greater the mental factor the greater the feeling of self-activity, and therefore the greater the pleasure. (2) Attention aids perception, as we have seen in our examination of reaction-time, mainly by preparing the ideational centres concerned. (3) Imagination, though founded upon experience, is yet able to transcend it. These three facts seem to us to indicate that we may often advantageously give the ideas first, so that they may be ready, as it were, to pounce upon the things when they are presented. We must, however, see that there is a reasonable chance of the things being presented soon before the ideas pass into oblivion. Let us give a concrete instance of what is meant. A picture of the native boats used in Madras was shown to a class of children. These boats are characterised by the planks being sewed together; and in the picture the stitches were quite visible. When asked if they saw anything peculiar about the boats, the children were puzzled; after some time and several inappropriate suggestions, one bright little girl perceived the stitches, and the rest followed in chorus. Now, had these children had a lesson a few days before on different kinds of boats, or had the special fact to be observed been mentioned incidentally, probably every one of them would have noticed it at once. A far-sighted teacher is constantly preparing such preperceptions in the minds of his class, and the self-activity thus induced gives the children a foretaste of real intellectual pleasure. The higher forms of interest all depend on the mind's ability to bring a rich store of allied knowledge to the presentation of the object, and to combine the two by exercise of its own activity.

§ 7. *Growth of attention.*—Interest, as we have already seen, always brings with it attention, and it is now universally recognised that the training of a child's attention so that he is not whirled hither and thither by every idle fancy, but is able to hold a self-consistent course amid the many distractions which surround him, is half the teacher's work,—the other half being to secure that the attention thus strengthened be rightly directed.

A young child has no command over his attention: even were long concentration possible for him, his nervous system is so unstable that it would be harmful. Great variety ought to characterise early lessons. This constant change in the direction of attention, while necessary and hygienic for the child, is fatiguing to the adult; hence the nervous strain involved in teaching little ones, which renders long periods of rest essential. Again, since in all but the most complex organisms the natural completion of an incoming stimulus is an outgoing one, we ought to recognise that a child's activity is a simple expression of his being which he is powerless to help. To expect a child under seven to "sit still and be good" for long is downright cruelty. Instead of seeking to repress this universal tendency to activity, the educator should make it his tool. Many lessons should be acted instead of simply learned and recited: the making of pictures, maps, plans, models gives endless scope for activity; indeed, in the case of little children, "Find work for the *hands* to do" is a fundamental rule of discipline.

In considering attention in the adult, we noted that it may be divided into three varieties, according to the nature of the object upon which it is directed, and we saw then that these varieties were felt to be of varying grades of difficulty (p. 131). We shall now see that these feelings of difficulty are correlated with the order in which the different forms of object attract the attention of the child. Sense stimuli appeal to it almost from the first, and are of course the only mode of appeal. No other is possible until, in common parlance, the mind contains a store of ideas—that is, until it develops so as to make an integral part of itself a psychological disposition corresponding to the external world. Hence with little children the only way to gain attention is to appeal to the senses. Even when the mind has in some degree developed, the object of attention must be based on sense stimuli. One reason why arithmetic and mathematics are such excellent instruments for training the mind is that they make unceasing appeal to the sense of sight, because the sense basis of attention changes with every new figure or line set down. All sense training is really training of the attention; it is or ought to be a systematic continuation of the process which Nature begins when she leads the little child tirelessly to seek to make himself acquainted with the properties of the objects which make up the external world. The average child before school age has done wonders for his own education: he has learned a language so that he can use it; he has learned the names and a few of the properties of one or two hundred objects; he has gained considerable command over his own body,—all this he has done by the unceasing use of his attention, which he turns hither and thither as impulse bids him. His knowledge is superficial and faulty, but he is constantly adding to and correcting it, and, best of all, it is his own eager desire which impels him to this process of addition and correction. The school now takes him, and too often, by repressing his natural activities and thwarting most of his instincts, gives him a dislike to the higher exercise of his intelligence, and leads him to concentrate his interests in the playground, where his nature is allowed free scope. And though a better day appears to be dawning, yet the question of how rightly to direct attention so as to avoid this result is one of the serious practical questions which psychology ought to take up.

The child's attention has hitherto been mainly directed to sensible objects, and these may be said to have taken possession of him almost as truly as he of them. The process is akin to reflex. But the beginnings of the higher forms of attention may be seen in his love for hearing and telling stories, where the object of attention is almost exclusively mental. Such imaginative structures must obviously be within the child's grasp—*i.e.*, must have come within the range of his experience. Hence it is clear that the development of the higher forms of attention can go on only as the knowledge of the child grows. This is the root of the saying that the development of conation depends on that of cognition.

§ 8. *Beginnings of definite volitions.*—When certain acts are repeated again and again, a definite path in the nervous system, as we have seen, is established; so that the series following upon the stimulus is carried out like a reflex and with a minimum of consciousness. In this way, as the child grows, habit tends to take the place of impulse, and the way is prepared for the development of the higher forms of will. The attempt has been made to fix the age at which volitional action first appears. The answer depends upon our understanding of the term. If we mean simply action which has a purpose or end, then some observers very plausibly find that the first indisputable examples are to be found in the imitation by the child of some movement made by another. Such imitations occur very early: a baby three or four months old will, for example, purse its lips and blow if it sees you doing so. These imitative movements, however, though showing that the nervous tracks bringing the muscles under the control of the ideational centres have been already laid down, should be regarded as ideo-motor rather than voluntary. The act is brought before the child's mind in a singularly vivid and persistent form, and, as we have seen, it is characteristic of such ideas when unimpeded to pass outward into action. Even when a child repeats an action, such as hammering the table with his spoon or dropping a toy, we must not too hastily assume that the repetition is a sign of conscious purpose, as it usually would be in an adult. After the first action has taken place the sensori-motor arc, which represents the course of the stimulus, will be in a state of heightened excitability; and when the same stimulus is applied again—say, by putting the toy into the child's hand—it naturally follows the same path; thus the repetitions may be continued until fatigue of the centres sets in, which condition is marked by a decrease of ability to transform a sensory stimulus into a motor one. All this time the child may show pleasure in the result of the act—*e.g.*, in the noise made by the falling toy—and yet may feel himself rather a spectator than an actor. Doubtless at an early period in such acts the child does foresee and desire the end, and throwing himself forward with the desire, becomes in this sense an actor; but by no outward sign can we fix the precise moment of this development. On the other hand, when a biscuit or piece of cake is held up to a child, and he promptly seizes it and puts it in his mouth, we can scarcely refuse to believe that he is actuated by desire in the full sense of the term—*i.e.*, that the sense stimuli proceeding from the cake rouse in him a vague notion of "good-to-eat," and that he is endeavouring to re-enforce this notion with the actual sensation. The beginnings of memory are apparent here, and it becomes clear that memory is a precondition of even such an elementary form of volition.

In all these early instances the end desired is in the immediate present, and when it is attained desire ceases; moreover, desire is awakened by a stimulus of the moment, and for some considerable time it remains on this perceptual level. Nevertheless, as the end of desire—no matter what the stage of development—is always some experience of the self, so it comes about that the early desires are important factors in building up the idea or the psychological disposition underlying the idea of the self, without which any high level of development would be impossible.

§ 9. *Complex volition.*—In the higher forms of desire memory-construction comes to play a more and more important part, while the sensory stimulus sinks to a minimum. For example, a child sees you preparing to go out, and desires to be taken a particular walk; he desires, moreover, to go one special way, to find certain flowers in certain places, and so on; so that his desire takes form in his mind as an intellectual construction of a very definite series of sensations which he desires to experience again. Further development on the same lines is apparent when the child desires experience he has never had. The story of the little boy who, when questioned as to what he most wished Santa Claus would bring him, replied, "A baby sister and a desert island," is a case in point. Here constructive imagination is coming into play (ch. xiv.)

The acts so far examined have been comparatively isolated. They have all, it is true, consisted of series of movements directed by one guiding plan. But it is evident that a higher stage still is attained when a whole succession of such acts is undertaken in obedience to one dominant purpose. Thus when a child writes a letter every week to her parents in India, a unity is apparent in her life which is quite different from anything we have yet considered. Similarly acts undertaken to win approbation or “because they are right,” show that relatively permanent psychical dispositions are being laid down which re-enforce some desires and inhibit others. The establishment of such rules of conduct shows that the child is approaching the volitional life of an adult, in which innumerable distinct acts are all subsumed under one purpose, and many desires are of such a nature that they cannot be satisfied in years or even a lifetime, but remain as an abiding part of the self.

The conflict between incompatible desires serves to define and strengthen these dispositions and to arrange them in a sort of hierarchy. Thus in the case imagined above, some great treat, such as a visit to the theatre, may be allowed to come in the way of the weekly letter. Afterwards, when the glamour of the temptation is past, the child's remorse, as she thinks of her mother missing the accustomed mail, may so strengthen her resolve to write regularly that no future counter-attraction may be seriously felt as a temptation. Yielding is thus sometimes more strengthening to character than resisting; for along with resistance there sometimes goes a dwelling on the pleasure we have denied ourselves, which actually strengthens its hold over us and renders us more likely to succumb on the next occasion. Possibly Browning had this strange fact in view when he wrote—

> “The sin I impute to each frustrate ghost
> Is the unlit lamp and the ungirt loin,
> Though the end in sight be a vice, I say.”

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[1] “The Statue and the Bust.”

We have dwelt chiefly on intellectual development as complicating the life of desire, but emotional development is obviously no less potent. On adolescence, for instance, the widening of the social horizon brings with it a host of new desires which often so overpower the old ones that sometimes the whole personality appears to be altered. Nothing is more remarkable, nothing to the inexperienced more alarming, than the storms of passion which sweep over the young man or maiden at this time; nothing more startling than the way in which they pass. Vows are piled on vows, and when the morrow comes where are they? You remember how, when Benvolio suggests—

> "Go thither; and, with unattainted eye,
> Compare her face with some that I shall show,
> And I will make thee think thy swan a crow,"

Romeo responds—

> "When the devout religion of mine eye
>   Maintains such falsehood, then turn tears to fires;
> And these, who often drown'd could never die,
>   Transparent heretics, be burnt for liars!
> One fairer than my love! the all-seeing sun
> Ne'er saw her match since first the world begun."

And all this, be it remembered, refers not to Juliet, but to Rosaline. Again, before the ball begins, he declares—

> "I'll be a candle-holder, and look on.
> The game was ne'er so fair, and I am done."

Half an hour later this worn-out life-weary youth is hanging on Juliet's loveliness:—

> "Did my heart love till now? forswear it, sight!
> For I ne'er saw true beauty till this night."

What is the explanation of this? Romeo himself supplies it:—

> "Tut, I have lost myself: I am not here;
> This is not Romeo, he's some otherwhere."

Far down in the mysterious depths of the personality the self is slowly crystallising out, marvellously little affected by these storms, which, violent as they appear, after all lash only the surface into waves. The wisdom of ages has recognised this, and does not balance youth's account too strictly. "Boys will be boys," and "young men must sow their wild oats"; but a wrecked or maimed life may result when the crop of wild oats is such that the *man* cannot trample it beneath his heel.

In a young child, when opposing impulses arise, there is a quasi-mechanical contest between them, and the strongest carries the day. Adults sometimes experience such a state when two opposing courses are open to them and they have no very decided reason for following either; they feel impelled first to one, then to the other, and in pathological cases the forces may be so evenly balanced that action is prevented altogether. As a rule, however, the permanent motive ideas are so numerous and so far-reaching that every suggested course of action is either helped or hindered by them. The very perception of the folly of hesitation acts as a spur to the impulse which happens to be uppermost at the moment and hurries it to completion.

We may now ask, Does the development of Volition resolve itself entirely into that of Cognition and Emotion? Is there no real development of conation? and, if not, what do we mean by strength of will? In children and in men and women of every age we have all met the quality that is known as obstinacy. Of late years many educators have begun to assert that obstinacy does not denote strength of will but weakness. This statement, however, presents only part of the truth. In a child's obstinacy there is both strength and weakness. The weakness consists in this, that the child's knowledge and experience are both so limited that the reasons you have for making him do something would find no responsive stir in his mind and need not be presented to him; the strength in this, that a fit of obstinacy is a strong assertion of that self of which the child is just beginning to become conscious. Now this strength of assertion, this throwing of all our powers into the carrying out of our purpose, is certainly an element in strength of will. It is, moreover, the primary element, the only one which a child can exhibit until he has formed his permanent ends. It is in some degree the same quality as perseverance; although, as its name denotes, its most prominent characteristic is the joy the young rebel feels in measuring his strength *against* that of another. The second factor in strength of will is persistency of desire, combined with the practical recognition of the fact that gratifying one desire means the inhibiting of a number of others. This persistency of desire seems to be innate in some minds, and is perhaps correlated with a physical basis similar to that which underlies a naturally retentive memory. Even when we are not blessed by this natural gift, our larger desires become so inwoven with our lives as a whole that we cling to them even after the first bloom of their attraction has passed away. Our pride—the dislike of being beaten or of appearing changeable—is enlisted as a motive. The habit of working with a particular end in view establishes itself, and makes it easier to continue than to cease; so that altogether a fair imitation of persistency of desire is established in most lives. Still it is in many cases only an imitation, and we have little doubt that much of the temperament of genius consists in the keeping alight the lamp of desire, so that the zest with which the spirit leaps towards the fulfilment of its life's purpose continues unabated till the end.

These differences of intensity do seem then to belong explicitly to the active side of our nature, but the increase of intensity which comes with growth is clearly seen to be due to the great influx of motor ideas which the widening of experience brings. Thus not even on this side is there any development of conation apart from that of the mind as a whole.

§ 10. This leads us to the third part of our problem —viz., In what sense is conation to be regarded as one of the fundamental aspects of mental life?

We see the conative process in its most intense form in states of desire, and at times when we are working for the gratification of our desires. When we imagine our activity in most vivid form, we are apt to think of it as bodily effort, as raising a weight, opening a door against resistance, &c. We cannot, indeed, take any effectual action in the world at all without using our body as an instrument; if we have any reform at heart we must go to committee meetings, we must stand up and speak, we must write letters, we must bestir ourselves to seek out other men and urge our wishes upon them, — and all these things involve muscular innervation. "If the muscles are undeveloped or grow relaxed and flabby, the dreadful chasm between good intentions and their execution is liable to appear and widen."[1] The pen is said to be mightier than the sword, but to wield the pen involves muscular action no less than to wield the sword. When we write, there is continual adjustment of the eye no less than of the hand. When we simply think, we usually think in words,—a process which, in most people, involves nascent articulation which may easily pass into "thinking aloud." When I forecast the course of a game of chess, I find myself silently saying, "If I do *that*, he will do *that*, then I shall do *that*"—and the emphasised "thats" seem to act as nails which fix the new state of affairs resulting from the supposed moves in my mind; no visual image of this new appearance of the board accompanies the conception. But even when thinking has not this evident accompaniment of muscular innervation involved in articulation, when it consists, for example, of series of visual images, many people maintain that motor adjustment is still its necessary concomitant: they maintain, indeed, that this adjustment is really the essential part of the process, that it is actually the essence of what we know as mental activity or attention. Bain and Professor Ribot may be mentioned as among the best known upholders of this view. To make clear this conception of the matter—which is of course diametrically opposed to that popularly held—we quote the following passage cited by James from Lange:—

"Let my reader close his eyes and think of an extended object,—for instance, a pencil. He will easily notice that he first makes a slight movement [of the eyes] corresponding to the straight line, and that he often gets a weak feeling of innervation of the hand as if touching the pencil's surface. So in thinking of a certain sound, we turn towards its direction or repeat muscularly its rhythm, or articulate an imitation of it."[1]

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[1] Stanley Hall, *Adolescence*, p. 131.

The contention is that the movement is first made, and as a consequence the thought of the pencil results; the passage quoted will serve merely as a sample to show the kind of evidence which is brought forward in support of this doctrine. The tendency of the theory is (1) to reduce attention to a reflex phenomenon in accordance with what Ribot calls "the fundamental principle of physiology, that reflex action is the type of nervous action and the basis of all psychic activity";[2] (2) to reduce the mind to a sensation-complex—*i.e.*, to maintain that sensations, perhaps accompanied by affective quality (pleasure-pain), are the material out of which the mind is constructed, and that self-activity in any real sense of the term is not to be attributed to it.

The great stress that this theory lays on motor phenomena is perhaps justified by considerations such as those brought forward at the beginning of this section. We shall, however, attempt to show (1) that attention is, as a matter of fact, not always accompanied by actual muscular adjustment, and hence cannot consist in its essential nature of that adjustment; and (2) that if the theory is modified so as to maintain that motor images accompany all thought, and form the essence of attention, yet that other sensory images—from which, indeed, they differ in no way except that the cerebral excitement accompanying them tends more directly to overflow into the muscles — may equally well be the accompaniment of the process of thought.[1]

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[1] James, *Principles of Psychology*, vol. i. p. 444; cf. also Sully, *Human Mind*, vol. i., ch. vi., § 4*b*.

[2] Ribot, *Diseases of Personality*, p. 13.

Let us first consider whether visual imagery depends, as Lange thinks, on ocular movements. With a view to answering this question, Professor James asked his students to experiment with imagined letters of the alphabet and syllables, and they reported that they could see them inwardly as total coloured pictures without following their outlines with the eye. He himself is a bad visualiser, and makes movements all the time. I found on experiment that I could easily imagine tall trees towering over my head without feeling the slightest tendency to movement. I then closed my eyes, put my fingers on the lids, satisfied myself that I could thus feel any movement of the eyeball, and imaged a large circle; I could not detect by any means that the eye tended to follow its outline. I then attempted to image a bird flying across the room in one direction, while I turned my eyes in the other. There seemed some hesitation about this at first, but in a few seconds I was able to execute the required combination fluently. The reader is advised to repeat and test all these experiments. I have asked friends whom I knew to be good visualisers to make similar trials, and their results agree with mine. The conclusion seems to be that movements are certainly not an essential concomitant of attention to visual images.

If we now turn to the nascent articulation which accompanies so much of our thinking, we shall, I believe, come to the same conclusion with respect to it. This nascent articulation is often accompanied by slight movements of the tongue and lips; but I find that if I close my lips firmly, and press my tongue against the roof of my mouth, the succession of articulatory images is not interfered with. Some of the writers who uphold the theory now under discussion, maintain that it is impossible to imagine such a word as "bubble" when the mouth is held wide open. Now not only do I find it possible to get a perfectly clear articulatory image of the word "bubble" in the circumstances mentioned, but I can image it or any other word while actually using the muscles (supposed to be involved) in repeating aloud some automatic series, such as the numbers one, two, three, &c. The articulatory images of words then stand on a par with visual images, and we must suppose that the excitement of the brain cells, which are active when these images are in the focus of consciousness, does not necessarily pass out of the cerebral centres in such a way as to innervate the muscles.

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[1] This conclusion would lead directly to the question, Is imageless thought possible? For a consideration of this question see ch. xiv.

The only constant concomitant of the thought-process is, then, cerebral activity, and no one, whatever his metaphysical opinions, would now think of denying the invariable presence of this factor.

When we attend to outward things—and we rarely attend to anything else—there is a reflex or automatic adjustment of the sense-organ concerned, and there is a heightening of tone in all or most of the muscles; the tense attitude characteristic of attention is well known. But if we agree that these muscular concomitants are not essential to attention, then we may expect to find the clearest expression of its nature in cases where such muscular adjustments are not necessary—*i.e.*, when we attend not to outward but to inward things. It occasionally happens that when we are engaged in worrying out some problem of abstract thought—*e.g.*, the very one that occupies us at present, namely, the intimate nature of the attention process, we wake in the morning to sudden and intense mental activity directed on this subject. Our eyelids, our limbs lie heavy and inert—no movement whatever takes place, any one entering the room would imagine that we were deep in slumber; but our thoughts are keenly active. Now this activity seems to consist—so far as we can describe it—in the holding of a certain thought-complex or congeries of related ideas in the focus of consciousness, and so encouraging it to develop. This development is like a process of growth; other ideas related to the central ones appear, some are welcomed and mingled with the original ones, and the aspect of the whole is thus changed; others are rejected as not furthering the end in view, and pass out of existence again. During the whole time the question is kept in view as indicating the unknown goal to which we wish to attain. The process is accompanied by an intense feeling of self-activity; when an explanatory hypothesis rises in the mind we seem to make active search for illustrative examples, we test them by the suggested hypothesis, and feel that it is strengthened or weakened by the result. Our aim is to reduce all events of a certain type (in the special case considered,—all individual acts of attention) to unity by subsuming them under one general law. If we are successful, then, the end being attained, the turmoil ceases. Now this general law which we are seeking, and which we feel will introduce consistency and clearness into the chaos of facts, does not in any real sense exist in these facts; it is a construction of the mind, and the endeavour after it is simply an expression of the mind's faith that the whole universe is constructed on lines which are in harmony with its own nature. This faith has found its justification in the great edifice reared by science, which we may figuratively regard as the slow yielding of the universe to the demands of the human reason. It is the mind, by its own activity, that leaps from the distinct and separate facts to their summation in the general law; and again, it is the mind which judges whether or not the general law does satisfactorily combine the particular facts. The mind is active, as we shall see later, in building up even the fragmentary world of sensation; much more is it active in building up the conceptual world of science.

In § 2 we referred to the Central Innervation Theory of Bain and others. This theory, it will be remembered, maintains that consciousness accompanies the nervous activity which innervates the motor nerves and regulates its amount. Owing to the development of knowledge it is now impossible for any one to hold the theory in its crude original form; its value has been that it roused its opponents to lay stress on those kinæsthetic sensations which had previously been overlooked, and so opened the way for a truer theory of movement. The immediate precursor in consciousness of a movement is a visual or aural memory image derived from previous experiences of the result of the movement, and memory images of the kinæsthetic sensations which formerly accompanied it. The activity in the sensory or other neurones which accompanies this imagery overflows into connected motor neurones, which bring about the movement of the muscles concerned. It seems impossible to detect any phase of consciousness corresponding exclusively to the excitement of the motor neurones; nothing seems to come between the idea of the movement and its execution. It is indeed possible that the motor neurones are simply the last sensory neurones,—those at the end of the chain,—in which case the consciousness accompanying the activity would be of a sensory nature.

For a criticism of the Innervation Theory, see James, *Principles*, vol. ii. pp. 492-518. For a brief presentation and criticism of Wundt's modified form of the doctrine, see M'Dougall's *Physiological Psychology*, "Temple Primers," p. 88.

The importance thus attributed to sensory phenomena in the production of movement may seem to the reader to tend to reduce the mind to a sensation-complex—a tendency which we pointed out as an objection when discussing the muscular theory of attention (p. 177). We believe, however, that a far truer presentation of reality is given when the emphasis is laid on the activity of the mind rather than on its passivity; hence it now devolves on us to inquire when this activity first appears;—is it an elementary process which can be abstracted and set alongside of sensation and "affection"? can it be conceived as existing in isolation from these?

In the very simplest form of life—a life which consists merely in the need for food and the satisfaction of this need—there is an element of self-activity; to put the matter in physiological terms, the response to stimuli varies with the state of the cell. In the complex life of the brain cells or neurones the same is true. There is a tendency on the part of some authors to image the passage of the nervous current as a mere passive inflow to the brain, a spreading of excitement from neurone to neurone as ripples spread on the surface of the water, thence an overflow into the muscles, and so the production of movement. It is, however, far more true to image the nervous current as caught up in the life of the cells, as transformed and transfigured by that life, and then sent forth to fulfil the purposes of that life. The life here referred to is the life of the cells as a whole—that is, it is the life of the mind; for only in the mind is the unity of the brain to be found. The mind we conceive as a growing being, and it is in and through this process of self-activity that its growth takes place. Even in sensation, which seems, till we study it, to be an example of mere receptivity on the part of the mind, we find this activity involved. We have noted already that in a sense the mind creates the light and colour and sound of which it forms its world, and this creation is a process which stretches over a long period of time,—possibly in some cases all our lives. As an illustration of this "creation," we find it stated that if the sensibility to colour of an average adult be taken as 100, that of a boy of thirteen would be 59, while that of a boy of seven would be only 37.[1] That of workers of tapestry, or of iron-workers who depend on the colour of the furnace flames to warn them of the state of the metal, would be again greatly superior to that of the ordinary man.

Now in the nature of the case this activity must have something to work on; we cannot even conceive of activity existing in abstraction from other elements of consciousness. In its highest forms, as we have seen, it involves the idea of an end; in its lowest form in our own life it becomes what Professor Stout has aptly called "felt tendency," and we become aware of its existence only when its gentle current is checked. Thus if we lie on our back on a sunny bank on a day in June we may let all the sounds of life about us sink to a mingled hum and seem to merge our being in that of nature, but if an interruption comes we become aware, by the dislike we feel for this interference, that our life-stream had a current of its own. Even here, however, it is the sensations which give colour to the stream, and if we eliminate them all seems to disappear. But the fact that we cannot conceive of "felt tendency" as existing in abstraction, is not to say that it has no existence at all. We seem more easily able to conceive of sensation as existing in isolation, but as a matter of fact the only sensation which could so exist is a vague "inwardness"—an experience of which we have in our present state *no* experience, and for which we have therefore no word. In such an existence if changes took place, they could not be known; there would be no growth, no discrimination, no memory. In the human mind sensation exists in abstraction no more than activity does; each is the correlate of the other.

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[1] Bianchi, *Psychiatry*, p. 181 (Eng. trans.)

We admit, then, that "felt tendency" does not exist in isolation; it is an element in our life distinguishable only by analysis; it is recognised most easily in those processes which we term conative—in processes involving desire and will. In such processes we have direct experience of felt tendency, which rises and falls in intensity independently of the other factors involved in the whole complex process. Thus the idea of the end may be clear or vague, but it is not its clearness or vagueness that determines the strength of the felt tendency. Similarly the muscular activity involved may be great or small, yet neither does this determine the strength of the tendency. This tendency is then a fundamental element in our life in the sense that, while it cannot exist in isolation, it can yet be distinguished by abstraction and set alongside sensation and "affection," into neither of which it can be resolved.

For an analysis of the conative process and a discussion of its relation to motor sensation and affective consciousness, see "The Nature of Conation and Mental Activity," by Professor Stout, *Brit. Jour. of Psy.*, July 1906; and see also ch. iv., § 3, above; and for references in connection with the general subject of this chapter, see ch. vi., § 5, above.

CHAPTER VIII.

SENSE-FEELINGS.

§ 1. *Organic sensations.*—In introducing the reader to a fuller treatment of the facts which we have already referred to under the head of Feeling (ch. iv., § 4), we must first point out and describe a class of mental processes which play a most important part in our mental life. These are called "organic sensations" or "internal sensations." They are intimately bound up with, and correspond closely to, changes in the activity of the internal organs of the body. They are always entering into and affecting our inner experience, just because the mind always is an embodied mind. To understand all the parts which they play in mental life would be to answer the question—at present unanswerable—"why the mind has a body." The consideration of the organic sensations is best approached from the physiological side.

Organic sensations are so called, first of all in broad distinction from external sensations—*i.e.*, sensations of light, sound, taste, smell, and "touch." We say "broad" distinction, because there is no sharp line of division to be drawn between organic and external sensations; there is a borderland. An external sensation is a conscious process aroused by the present operation of an external stimulus[1] on the nervous system. The external sensations are the beginnings of information about our surroundings; their natural result is an intellectual attitude, expressed in the query "What is this that affects my senses?" But the stimuli which arouse organic sensations are physiological processes within the organism.

Has the reader realised what an almost inconceivably complex thing his living body is? Some of the great foundations of this complex structure are easily noticed even by the unscientific eye. Such are,—the organs of respiration, by which the outer air is brought into connection with the blood,—the organs of nutrition, by which food and drink are assimilated,—the organs of circulation (the "beating" of the heart and the alternate expansion and contraction of the blood-vessels),—the organs by which human beings are able to reproduce their kind; but these are only some of the principal factors in one indefinitely complex process of upbuilding and down-wearing changes, which are always going on in every part of the bodily economy. We say, of *one* complex process: for all these various processes work together to form one living whole; they belong together more intimately than the parts of the most delicately constructed machine; their unity is as intense as their variety is great. It is of the processes embraced in this unity that we are thinking when we say that organic sensations are those which directly correspond to the various changes in the internal organs. Connected with nearly all these organs are sensory nerves capable of conveying multitudinous impressions from all parts of the body to the central nervous system.

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[1] Or of some equivalent condition, as when a blow on the head so far stimulates the nerves concerned in vision as to make us "see stars."

What, then, should we expect to find, corresponding to all this, on the mental side?

Distinguishable varieties of sensation exist, corresponding to these various processes, *so far as sensation is needed* to furnish the basis of information as to the state of the organ. "Movements of the viscera [internal organs]," says Dr C. Mercier, "that do not discharge their contents externally have no accompanying sensation. No useful purpose could be served by the acquisition of such a sensation, and therefore no such sensation has been acquired. Had it been as important to the welfare of the individual to be aware of the distension and emptying of his gall-bladder as of the distension and emptying of his urinary bladder, no doubt the sensations accompanying these conditions in the one would have been as vivid as in the case of the other. So, again, in turning the eye to the light, we have no sensation of the closing in of the pupil to shut out the glare; none is needed." Hence there are a vast number of factors contributing to the bodily life—and some of them most important factors, as the secretions of the glands—which, in a healthy state, go on with a minimum of accompanying sensation. In a healthy state; for, as Professor J. Jastrow has well put it, "in health these functions conduct themselves invisibly, silently, imperceptibly, like well-trained servants. But when the delicate balance of one or other of these functions is interfered with, all sorts of sensations, more or less vaguely localised and indefinitely realised and difficult to describe, but all variously unpleasant, make themselves felt. . . . There seems established within the body provision for rare and unusual forms of feeling in connection with disturbance of function, along with a serviceable apportionment of consciousness among the normally functioning activities."[1]

§ 2. *Varieties of organic sensation.*—We proceed to describe some familiar forms of organic sensation, namely, the general vital feeling; the feelings of muscular action; of nerve-action; of respiration; of the alimentary canal; and of internal heat and cold.

(i) We should expect to find—at the bottom of consciousness, so to speak, and distinct from the feelings of the particular processes in the body—a vague and diffused but very real feeling corresponding to the changes in the course of *bodily life as a whole* from moment to moment,—its more or less harmonious or impeded progress, and the more or less successful *co-operation* of its various factors. It is noteworthy that the central nervous system is not only affected by the sensory nerves (referred to in the previous section) from the various internal organs, but is directly affected by the general state of the body, and especially by the character and quantity of the blood supply. Hence the multitude of bodily processes which are not each (in health) accompanied by distinctly appreciable sensations, do none the less contribute a total experience which gives a "tone" or "mood" to our whole consciousness. It is a massive diffused experience, which may be described as the "feeling of bodily life," varying as "health," "comfort," "briskness," "general fatigue." One of its pleasantest forms is the reaction of a vigorous body after exercise, or the tonic that comes of "bracing air"; examples of its more unpleasant forms are feeling "out of sorts," "run down," or "ill," without being able to assign the trouble to any particular part. This general vital feeling is variously described as "common sensibility" or *coenæsthesis* (German *Gemeingefühl*).

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[1] *The Subconscious*, pp. 10, 12.

The various distinguishable organic feelings appear to *arise out of* this general vital feeling, or to differentiate themselves from it; it is, so to speak, a sea of which they are distinct waves. Some bodily processes are more intimately instrumental or organic to bodily life than others; hence the feelings attending the former are naturally less differentiated from the vital feeling than those attending the latter. But since all the bodily functions—including those of the external sense-organs—are in some degree instrumental to bodily life, no one of these feelings is completely differentiated from the vital feeling, but seems to have it for a background. Thus the muscular feelings are merged in the vital feeling when the movement is one which is essential to life—as in the case of the heart. They are more distinct from the vital feeling when the movement is less immediately necessary to the continuance of life—as in the case of movements of the eyes, vocal organs, limbs, and head.

(ii) When the muscles contract in moving a limb, several physiological factors (as we have seen)[1] contribute to the conscious experience: the strain in the muscle itself and in the tendons, the flexion, &c., of the skin, the sliding of the joints: these all contribute to what is called muscular sensation. How these affect us, as regards pleasure and pain, depends not only on the organs themselves but on the general condition of the body. Muscular exertion, after rest and nourishment, is always pleasant; a period of indifference ensues, which may (according to the constitution of the person and the nature of the movements) be almost indefinitely prolonged; on the other hand, the continued exertion may soon become increasingly painful. Exercise in the discharge of surplus energy is an important source of bodily pleasure; so is the condition of muscular repose after ordinary fatigue. All these feelings are complicated with others, due to what we may call the *diffusion of bodily effects.* From the nature of the case the exciting cause of an organic sensation is not limited to one definite portion of the body organised specially for the reception of the stimulus (as the *retina* in the case of sight);[1] there are no "end-organs" in the nerves conveying impressions from the internal parts to the central nervous system; in proportion to its intensity the stimulus produces more or less widespread effects on other parts, and the resulting feeling corresponds to this whole disturbance. This is the case, as we observed, with muscular action; but, notwithstanding this complication, the special character of the feeling which corresponds to the state of the muscles can be detected. Thus, in the case of *repose*, as Bain says, "the other organic accompaniments cannot disguise the muscles' own sensibility to the condition of repose; the feeling is one that has a certain reflection of energy—

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[1] Ch. vii., § 2.

> 'Even in our ashes glow their wonted fires.'

There is, in rest after exercise, a close kinship to sleep, as if part of the fact were already realised."

The feelings of muscle, tendon, joint, and skin in movement, are on the borderland between external and internal sensations, for they contribute materially to our estimation of weight, resistance, and space-relations. The feelings of muscular fatigue and repose are internal in the stricter sense, as are those of muscular injury. Under this head we may refer to the example of *cramp* (which is also a typical example of an intense organic sensation). This feeling, which is usually extremely painful, is aroused by the spasmodic contraction of one or more muscles, due to some abnormal irritation of the nerves attached to them. It is only too familiar to experienced swimmers, being sometimes brought on by exposure of the limbs to cold. Dr J. O. Affleck thus describes the experience: "In its most intense form, that of cramp in the limbs, this disorder comes on suddenly, often during sleep, the patient being aroused by an agonising feeling of pain in the calf of the leg or the back of the thigh, accompanied in many instances with a sensation of sickness or faintness from the intensity of the suffering [an example of the diffusion of effects]: during the paroxysm the muscular fibres can often be felt gathered up into a hard knot." In the severe pains due to laceration or other injury to the muscles, the diffused effects, which complicate, extend, and intensify the feeling, often embrace the involuntary muscles and glands (as in the production of violent sobbing), the skin, the heart, the lungs, and other organs.

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[1] Even in the case of the special senses, there is, as we shall see a similar "diffusion of effects."

(iii) A special class of feelings is related to the organic condition of the nervous tissue. Such are: *neuralgic* pains of all kinds (including *migraine* or "sick headache"); the feeling of nervous exhaustion, brought on by over-exertion of body or of mind, or by insufficient rest or food, or by intense or prolonged suffering; the feeling of nervous "exhilaration" and "freshness," which is an important factor in the general feeling of good health. This exhilaration can be produced for a short time by the use of stimulants,—to be followed, as every one knows, by a more or less violent reaction.

(iv) Organic sensations of respiration may be detected. Respiration is the inhalation of oxygen into the lungs and its chemical combination with the red corpuscles of the blood. The healthy action of the lungs is merged in the common vital feeling. Nevertheless there is a characteristic sensation corresponding to the action of the lungs; it is felt in an intense form in "suffocation," which is due to want of oxygen, from whatever cause arising. This is, in the literal sense of the word, an *unbearable* feeling. A similar feeling, but far less intense, arises from impure air—*e.g.*, on entering a crowded room.

(v) Organic sensations connected with the *alimentary canal* are capable of several different forms: hunger and its satisfaction, thirst and its satisfaction, nausea, and the pains of deranged digestion, are the most prominent. Hunger is really the expression of a general want of the bodily system; but the special feeling is localised in the stomach. In its earlier stages it involves no acute pain, but appears as an active impulse to seek food. In the absence of satisfaction, it is followed by severe suffering in the region of the stomach, and a general feeling of weakness or faintness, due to the diffused effects of the organic need. The characteristic sensation of hunger is only a localised expression of this general need; and the sensation ceases when food is introduced either in the usual way or by other means. Similarly thirst, which begins as a feeling of dryness in the tongue and throat, is the expression of the deficiency of water in the system, and may be satisfied by the injection of water into the blood, the stomach, or the large intestine. Derangements of the digestive organs have diffused effects which are only too familiar. One of the most distressing of these, nausea, is sometimes of purely nervous origin; in the extreme case of sea-sickness it is always so; the beginning of this affection is a nervous malady produced by the unusual motion. This is an impressive example of *the direct effect of a state of the central nervous system on a group of vital functions*, with massive feelings corresponding.

(vi) Organic sensations of temperature may be classed as external when resulting from direct stimulus to the skin; but even then they become organic when the stimulus is violent, when the application of hot *or* cold stimuli produces, not temperature sensations at all, but in both cases an intensely painful sensation of a peculiar quality.

The physiological basis of internal heat or "animal heat" is the chemical combination of the inhaled oxygen in the lungs with the internal products of food-substances in the blood. One of the main factors in its regulation is the expansion and contraction of the small blood-vessels (capillaries) regulating the blood-supply to all parts of the body. Our *feelings* of bodily temperature are not always a correct indication of the reality; for the basis of the *feeling* is the impression of heat or cold produced in the nerves of the skin. The temperature of the skin may be low, owing to the presence there of a smaller quantity of blood than usual: then we have a feeling of internal cold, while the real bodily temperature may be perfectly normal or (as in certain fevers) dangerously above the normal; and the reverse may be the case when the skin is hot and red with the distension of the capillaries there.

There are varieties of internal feeling, some of greater and others of less physiological importance, which are not referred to here.

Organic sensations are feelings in the sense explained above (ch. iv., § 4). They are subjective experiences in the sense of being expressive of the state of the individual himself,—in this case his *bodily self;* and they all have the characteristic (whether or not they are distinctly pleasant or unpleasant at any given moment) of *tending* to become definitely pleasant or agreeable, or definitely painful or disagreeable; in other words, they have affective quality, but the pleasure or pain is not the whole of the feeling.

The region which we have been looking at is the darkest in the whole range of psychological inquiry; it is also one of the most important. Introspection is almost useless; and the more sound and healthy the physical organism is, the less possibility is there of any physiological evidence to be obtained therefrom. We have to rely on fragments of evidence from pathological cases in which the organic feelings are not in the normal condition. Their psychological importance lies first in the deep influence which they have on the movements of feeling aroused by distinct sensations and ideas. We are not yet able to give an exact account of the nature and limits of this influence. They are also a factor in the formation of the *feeling of familiarity* growing round objects which have previously or repeatedly entered into our conscious experience.

On organic sensation in general, the student should consult some of the following authorities: Bain, *Senses and Intellect*, ch. ii.; Ribot,* *Psychology of the Emotions* (Eng. tr.) and *Diseases of Personality* (Eng. tr.); Mach, *Bewegungsempfindungen;* Richet, *Recherches expérimentales et cliniques sur la sensibilité;* Bertrand, *L'apperception du corps humain;* Colsenet, *La vie inconsciente;* Kröner, *Das Körperliche Gefühl;* Beaunis, *Les sensations internes.* On the "static sensation," or "sensation of equilibrium," full references are given by Professor J. G. M'Kendrick, *Ency. Brit.*, suppl. vol. xxxi., pp. 754, 755; see also Külpe, Eng. tr., pp. 149-152.

There are short but good accounts of organic sensation in Höffding,* Eng. tr., pp. 221-228, and Külpe, pp. 146-152.

§ 3. *Other characteristics of organic sensations.*—(i) Usually in mental life we can distinguish the process which affects us pleasantly or the reverse from the affection itself, as in the case of painful memories, pleasant dreams, unpleasant expectations. In such cases there is a process of presentation (ch. iv., § 5) which arouses an affective process. The most obvious and striking fact about our organic sensations is that we cannot distinguish in this way (*a*) a presentational and (*b*) an affective element. Some psychologists say that we find the presentational element in certain temporal and spatial characteristics by which we distinguish one kind of such feelings from another. It is quite true that these feelings have characteristics other than those of mere intensity; they are assigned (as we have seen) to different parts of the body, or localised; they may vary in duration and in temporal sequence or rhythmic alternation ("throbbing," "beating," &c.) and in local distribution ("piercing," "pricking," &c.) But these presentational elements—if such they can be called—in the feeling *afford us no knowledge* other than to enable us to express the difference between one kind of feeling and another. Hence Sully says that "feeling in its lower forms does not seem to follow or depend on presentative elements; the *initial* phase arising out of organic sensation is distinctly one of feeling; it is this which lends support to those who regard bodily feelings as prior to intellect"—*i.e.*, who suppose consciousness to begin as mere feeling.[1]

The theory referred to by Sully is represented by Horwics, *Psychologische Analysen*, part i., who attempts to account for the genesis of other mental processes out of what he calls "feeling" (*Gefühl*). See Ward's criticism, article "Psychology," p. 40. It is now generally recognised that such a theory as that of Horwics is impossible, if by "feeling" is meant the pure affective quality (pleasantness or unpleasantness) by itself. The argument breaks down as soon as we substitute the words "pleasure or pain" for "feeling," *Lust oder Unlust* for *Gefühl.*

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[1] *Human Mind*, vol. i. pp. 69, 70.

We have been calling these internal feelings "sensations"; but by this we imply only that there is no distinguishable presentative process underlying the organic pain or pleasure as there is in other cases. We have committed ourselves to no theory but that every such feeling is closely bound up with a conscious process which cannot be subjected to analysis and discrimination apart from the feeling itself.

Certain psychologists say that some at least of our organic feelings are sensations, and mean much more by it than what we have said above. They mean that these pleasures and pains are sensations on the same level with sensations of touch, resident in certain parts of the body where there are specific nerves and nerve-endings corresponding to them. It has been claimed that such nerve-endings have been actually discovered in the skin in the case of *pain* at any rate, and that cutaneous pain is a specific sensation resident in minute spots of peculiar sensitiveness to pain, interspersed among the "pressure" and "temperature" spots on the skin (as to these, see below). It is further observed that in certain cases the pain produced by a stimulus on the cuticle appears to precede the sensation of touch; while in certain other cases the reverse is the fact, and the pain seems to take longer to be produced than the sensation of touch (these facts are carefully summarised by Höffding, pp. 223, 224); and that in certain pathological cases a sensation of pain or pleasure pure and simple may occur.

All this is entirely a question of physiological and pathological evidence. The evidence, such as it is, refers (as we have implied) chiefly to the alleged pain-sensation (German *Schmerz*). It has been critically examined by Mr H. R. Marshall, *Pain, Pleasure, and Æsthetics*, ch. i., § 4 (pp. 15-22), and in the *Psychological Review*, vol. ii., No. 1, p. 61; and by Lehmann, *Hauptgesetze des Menschlichen Gefühls-*

lebens, pp. 31-55. Both these writers have decided against the theory of pain-sensation. The same view is taken by Ribot, *Psychology of the Emotions*, part i., ch. i. (Eng. tr., pp. 26-29, 37-39). The truth is that the observations which most distinctly favour the pain-sensation theory are highly questionable, and those which are not questionable are capable of alternative explanations. Hence the question is by no means settled. The most important references (besides those given above) will be found in Ribot, *op. cit.*, and under the heading "Pain-sensation" in Baldwin's *Dictionary*.

(ii) The internal sensations are capable of the most sudden and the most extreme variations in intensity. The suddenness with which, in cases of disorder, they make themselves felt, is well illustrated in the following observations, which also show the mental effect that such changes may have. The cases—which are notable examples of the sudden onset of influenza—are given by Dr T. Clifford Allbutt, Regius Professor of Physic, University of Cambridge. "The first," he says, "was sent me by Dr Dawson Williams. It occurred in a gentleman who, when working in his garden, was called in to tea: he turned to go in, but as he did so, was seized with a sense of prostration so utter that he could hardly crawl to the window, and he crossed its threshold only to sink exhausted into his arm-chair. The second, which was narrated to me by Dr Cane, of Edmonton, was even more remarkable, as a feature of the onset was a sudden assault on the mind. This victim, when attacked, was at a railway station, in the full sense of wellbeing and happiness, when so sudden a stroke of misery befell him that he had to implore his companion to carry him into the waiting-room, and to detain him there forcibly, lest he should seek destruction by throwing himself under a passing train. And the misery may as suddenly vanish. Of such recoveries, Sir William Church told me that after weeks of depression, and while going about his work in a doleful, perfunctory spirit, the patient bethought himself, almost in a moment, that afternoon tea would be very welcome, and promptly welcome it was: it tasted delicious, and the enjoyment of it was the prelude, or rather the fulfilment, of release from his despondency."

The extent to which the organic sensations can vary in intensity, from the barely noticeable to the extremely violent, is a matter of common experience. The degrees of physical agony that we are capable of feeling have won a recognition that is deeply embedded in human thought and language. Let any such sensation be intense enough, and it will monopolise the whole of consciousness; self-observation, and all attention to outside facts, will be suppressed; there will be no attention even to the sensation itself, if "attend" means deliberately to notice anything about it or observe it. The consciousness, in such a case, *is* simply the feeling.

(iii) The internal sensations always have what has been variously described as a "diffused," "massive," or "voluminous" character. Not that they are like solid things occupying space; but they have this quality which can only be described by spatial metaphors, and which, says Professor Ward,[1] "every one knows who knows the difference between the ache of a big bruise and the ache of a little one." This applies not only to the general vital feeling but to all the internal feelings.

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[1] Art. "Psychology," p. 46.

Its physiological foundation consists in the "diffusion of effects" to which we have repeatedly referred.

(iv) The internal sensations are revived very easily and in a peculiar indirect way. What is revived is the bodily condition itself,—more or less fully; some perception or idea reinstates the bodily condition, with which it was originally associated, and which we feel again. A person has repeatedly to take a short sea voyage, on which he is invariably ill; among his other experiences on this voyage, there is the playing of a violin by an itinerant musician who always accompanies the steamer. This association is enough to make the notes of any violin which he hears, for a long period afterwards, partially reinstate the bodily condition and characteristic feelings of nausea.[1]

This is an example of the peculiar indirect way in which organic sensations are revived. An external impression (S) on the central nervous system excites x (internal changes or reflexes, arousing an organic sensation); hence s (idea of S) excites x, and therefore also the corresponding organic sensation. In the case mentioned, a distinct impression (violin-playing), originally associated with S, becomes itself capable of directly exciting x.[2] The case of *tickling* affords another example. Tickling (S) produces an effect on the central nervous system which in turn has diffused reflex effects (x) through the body, and arouses various organic sensations; and the mere anticipation of S is sometimes enough to arouse x with its attendant sensations. In the same way the mere sight of nauseous food (involving of course the mere idea of consuming it) may be enough to arouse the internal changes attended by a sensation of nausea. The sight of a sword is said to have produced very unpleasant internal sensations in King James I.; if so, it was by the same indirect means.

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[1] This is an actually authenticated case.

[2] Cf. the illustration of "conditioned reflexes" given above, ch. vii., § 1.

§ 4. *Feelings aroused by special sensations.*—We now pass to cases where we can distinguish (*a*) the psychical process which arouses the feeling, and (*b*) the feeling itself; and, first, to the class of feelings dependent on the sensations of the "five senses,"—light, sound, flavour, odour, pressure, temperature.[1]

(*a*) Any such sensation normally follows upon the excitation of a *sensory* nerve, when the excitation is conveyed to the brain: in other words, it follows upon an *afferent* nerve-current. (*b*) Physiology shows us that every such afferent stimulus tends, on reaching the centre (in this case the brain), to discharge an *efferent* nerve-current through a *motor* nerve, which tends to result in movement. This sensori-motor arrangement is typical of the structure of the central nervous system. In addition to this, there is a further "diffusion of effects"; for while a stimulus to the nerves of a special sense (*e.g.*, hearing) arouses an appropriate sensation, it has also a diffused nervous effect, which may be very intense (*e.g.*, when a noise "sets the teeth on edge"). (*c*) Again, we must remember the constant action and reaction between the central nervous system and the general organic conditions of the body. The former may affect the latter directly, and thus add organic sensations to the original special sensation; and again, the organic conditions affect the central nervous system not only through sensory nerves connecting the internal organs with it but by other means, such as variation in the blood-supply: this further complicates the organic sensations.

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[1] The sense-organs for pressure and temperature are in the skin, hence in popular language they are taken as one "sense," usually called "touch."

Thus there are three factors, on the physiological side, in the production of a sense-feeling:—

(*a*) the stimulus of the special sense-organ,
(*b*) the diffused nervous excitation (including the motor tendencies aroused),
(*c*) the accompanying organic complications.

This means that (*b*) and (*c*) add to the special sensation an escort—so to speak—of organic sensations. Now (*b*) and (*c*), as well as the sensation aroused by (*a*), have affective qualities of their own. We do not say that the affective qualities belonging to (*b*) and (*c*) are usually—or even often—intense. On the contrary, they often escape notice altogether; but they are present, and lend to the particular experience a character which it would not have if they were absent.

We will now give a few concrete illustrations of these somewhat abstract statements. The diffused bodily excitement by no means always escapes notice; Professor Ladd and Professor G. F. Stout have laid stress on its effect in adding a special character to the affective tone of sensations. It may be seen even in the case of sensations which have *little affective tone of their own.* These writers refer, for instance, to the highly disagreeable character of the "distraction" caused by being spoken to in a whisper, or lightly touched, when one is listening to a series of sounds, or looking intently at some object. The displeasure is not aroused by the whisper or touch *itself*, but by the diffused bodily and mental excitement connected with it. The same is true of the strong pleasure (or displeasure) produced by stroking, tickling, or rubbing. When *the affective tone* *of a sensation is strong*, the diffused effects may also be noticed. A bitter taste, or a piercing railway whistle, may be unpleasant enough in itself, but these other accompaniments may make it horrible. A sweet taste may be intensified by the same cause; or, again, though pleasant in itself, may become "on the whole" nauseous through the diffused effects aroused. When these effects are much less noticeable in themselves, they appear as *different qualities of the various pleasures and pains.* "The pleasure of a sweet taste," says Professor Stout, "differs in kind from that of a bright colour or a musical note; and the difference cannot be wholly identified with the qualitative diversity of the sensations of sight, taste, and hearing themselves." But even in pleasures and pains of the same sense, these differences exist. *The way we feel* is not by any means always the same for all equally pleasurable or equally painful sensations of the same sense. "Some agreeable sweet odours," says Professor Ladd, "are described as 'heavy,' others as having an enlivening or 'spicy' quality. . . . Pleasant coolness is 'refreshing'; pleasant warmth is 'cherishing.' . . . Musicians have always attached different distinct kinds of feeling to different musical instruments, and to different keys and chords. . . . Bright light and mellow light produce differences in the character of the equally pleasurable feeling which may result."[1] It seems clear that these differences cannot be identified with the difference between pleasantness or unpleasantness, or between various intensities of these; nor can the affective differences, in the proper sense of the word, be reduced to these other differences of nervous and organic origin.

It is, however, in the case of impressions of sight and sound that the "escort of organic feelings," which always accompanies them, is usually so faint as to be neglected, in practice, as compared with the sensation itself and the feelings and interests dependent on it. But it is most important that they should be distinguished; and in certain cases we cannot ignore them even practically. Suppose the sense-organ—through over-use or for some constitutional reason—is in a strained or unhealthy condition; then we are aware on the one hand of the feelings accompanying the working of the organ, and on the other hand of the feeling belonging to the special sensation. Thus, I may be pleased with a colour, while at the same time I experience some feeling of discomfort in connection with my organs of sight. If we further suppose the organ to be structurally injured,—if, to take the instance which most readily occurs, we suppose the external stimulus to be so intense as to have this effect,—then the organic feelings may be so intense as to draw to themselves the whole energy of consciousness in the effort physically to get rid of the stimulus.

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[1] *Psychology, Descriptive and Explanatory*, pp. 184, 185.

What we must insist upon is this: the affection aroused by the special sensation itself is a real mental fact, and is not to be identified with, or explained away through, the processes marked (*b*) and (*c*) in the foregoing paragraph.

§ 5. *Conditions of the affective quality of sensation.*—The pleasurable or painful character of a sensation depends (*a*) on its quality, (*b*) on its intensity, (*c*) on its duration.

(i) The quality of a sensation is its most fundamental attribute, and makes the sensation what it is; quality is what distinguishes "blue" from "red," "sweet" from "bitter," "warm" from "cold." The other attributes depend on this one. Sensations which differ in quality are different sensations; a sensation may *generally* change in intensity or duration without becoming a qualitatively different sensation. Unfortunately any statements we can make as to the dependence of affection on the quality of sensation are only true "on the whole" or "as a rule." It is not certain that there is any *quality* which is absolutely and always pleasant (or unpleasant). This is because the affective tone of a sensation depends also on its intensity. All we can say is that, apart from all personal variations, certain qualities are distinctly preferred to others. The student should be able to examine this for himself,—comparing, for instance, low (musical) tones with high ones, one colour with another by daylight (blue, green, red, yellow), sweet tastes with bitter, warm cutaneous sensations with cold ones, smooth or blunt touches with rough or sharp ones. He should remember that what he is considering is the affective tone of sensation in itself, neglecting as far as possible other factors in the context of mental experience in which it occurs.

(ii) We may say also that no single *intensity* is absolutely and always pleasant (or unpleasant), for quality enters in; but, quality remaining the same, affection does vary, and may vary greatly, with intensity. A sensation must have a certain minimum of intensity before it can arouse any affective tone at all. This may be called the affective threshold or *limen*.[1] If it then begins to be felt as pleasant, its pleasantness increases in intensity up to a certain point, where it remains constant for a while, and then more or less quickly becomes unpleasant. The following is an illustration. Hold your finger in water whose temperature gradually rises from 35° to

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[1] On the conception of a threshold of consciousness, see above, ch. iii., § 4.

50° centigrade during the space of two minutes and twenty seconds: you feel at first an agreeable warmth, then some slight, unpleasant prickings, then oscillations of intense prickings with moments of rest, and lastly, pain.[1] As we have already observed, continual increase of intensity injures the sense-organ, and the experience becomes purely "organic." If, on the other hand, the sensation begins to be felt as unpleasant, its unpleasantness increases with increase of intensity. The student should verify this result for himself, so far as possible, bearing in mind the caution given at the end of the previous paragraph.

Some writers have supposed that the transition from pleasant to unpleasant sensation must take place through a neutral state which is neither,—the "zero" of the affective scale. This theoretical assumption has never been definitely verified in experience; and Lehmann has found that the transition from pleasure to pain, in some cases at least, does *not* take place through a neutral state.

(iii) In the case of duration,—quality and intensity being supposed not to change,—similar results are obtainable with a sensation which begins to be felt as pleasant; its pleasantness increases in intensity up to a certain point, where it remains constant for a while, and then more or less quickly becomes unpleasant. But if a sensation begins by being felt as unpleasant, its unpleasantness increases up to a certain point, at which it may remain for a long time; afterwards its unpleasantness may decrease. The same conclusions apply when the sensation is not continuous but is repeated intermittently. In such cases it is a matter of common experience that a sensation originally unpleasant may lose its unpleasant character by repetition, as when "custom blunts feeling." Professor Ward speaks of chemists sorting the most filthy mixtures by smell and taste without discomfort. There is also the possibility that a sensation originally unpleasant (more or less) may at length become pleasant, as in the case of "acquired tastes."

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[1] This result was obtained by Lehmann.

The study of sense-feelings should be pursued in Sully,* *The Human Mind*, vol. ii., ch. xiii., §§ 7-21; ch. xiv., §§ 1-9. All the most important results are summarised by Stout,* *Manual*, bk. ii., ch. viii., and Höffding, pp. 221-233, 267-275. The *methods* of research in this department should be studied in Lehmann, *Hauptgesetze d. Menschl. Gefühlslebens.*

In a book like Ribot's *Psychology of the Emotions*, where the greatest stress is laid on the bodily or organic side of feeling, the direct dependence of affective tone on sensation is scarcely discussed. It is carefully examined by Lehmann, pp. 172-196, and by Külpe, §§ 34, 37 (Eng. tr., pp. 225-230, 247-250). In the former of these passages Külpe well shows that the affective tone is not a *mere* attribute or a *mere* function of the sensation. It is a psychical process of a new kind, supervening on the sensation and aroused by it.

The question of a so-called "neutral feeling" is of importance only because Bain has vigorously defended the view that there really is—in addition to pleasure and pain—a third kind of affection which is neither pleasant nor unpleasant. Now the very possibility of raising this question—which is a purely theoretic one—implies that there actually are feelings which are *practically or comparatively* indifferent; the only question can be, what theoretic account we are to give of them. Höffding introduces the question in connection with the "law of relativity"—viz., that a feeling is partly determined by its contrast with other feelings. "To suppose that pleasure must always have pain as a background would be to misunderstand the law of relativity; it is most impressive when it follows upon pain, but it may also perfectly well have as background a weaker feeling of pleasure. . . . It is in itself a meaningless employment of terms to call a pleasure or pain negative; all feeling as such is a real, consequently a positive, state. . . . The feeling that is mainly determined by contrast with another feeling is not on that account less real and positive." Without disputing the "law of relativity," so understood, we must dispute an application of it which Höffding proceeds to make. "It has been thought that there is a neutral point, denoting indifference, a point at which neither pleasure nor pain is felt. . . . A purely theoretical treatment might, indeed, lead to the view that, in the line which leads from the highest pleasure to the strongest pain, there must be a central point equally far from both extremes. But this theoretical centre cannot be the expression of a real conscious state. For if we reach it from the side of pain, it will be felt as pleasure; if from the side of pleasure, as pain—and until an accommodation has been effected, as both. This is a simple consequence of the law of relativity." This reasoning is only sound on the supposition that the point of indifference is something *objectively* fixed; but no such assumption can be made as to the neutral point. If pleasure or pain can diminish indefinitely and continuously (in degree), a *zero* must be reached; and if from the *zero* pain or pleasure can begin and increase, this is all that such a conception of the point of indifference requires. A pleasure which is decreasing does not turn into a pain simply in virtue of its decrease, as Höffding seems to imply. It thus becomes something of an elegant refinement to decide whether pleasures and pains, which are of indefinitely small intensity, shall be called "neutral" or not. The cases of "surprise" and "excitement," on which Bain dwells, are primarily *active* states. There may be active occupation with little corresponding feeling, for intensity of feeling may diminish more rapidly than intensity of action or concentration. On this subject, see Sully,* vol. ii. pp. 4, 5, 29-32; Höffding, pp. 286, 287; Külpe, pp. 242, 243; Ribot, *Psychology of the Emotions*, pt. i., ch. v. (pp. 73ff.)

Wundt (*Outlines of Psychology*, pp. 82ff) expounds a "tridimensional" theory of feeling: a feeling may at once vary in the following qualities—(*a*) pleasantness or unpleasantness, (*b*) excitement or repose, (*c*) strain or relaxation. This is tenable only by a combination of active elements with others under the one name of *feeling*. Accordingly we find the author elsewhere speaking of "feeling" in a way which shows that he regards it as essentially a *reaction* of the subject on the presentation.

We have now surveyed two main divisions of the life of feeling. We have examined typical cases of feeling (*a*) at the level of internal or organic sensation, (*b*) at the level of external or special sensation. A third great division of the subject yet remains.

CHAPTER IX.

THE EMOTIONS.

THE third main division of the feelings consists of the Emotions, which are feelings aroused by the perception of objects and by free ideas of memory and imagination. Perception is a form of knowledge; in psychology it is understood to be limited to the knowledge which involves the occurrence of actual sensation as distinguished from mental imagery.

§ 1. *Psychological qualities of the emotions.*—In connection with the treatment of feelings at different levels of mental life (internal sensation, external sensation, perception, and ideation) some psychologists seem to fall into a serious logical blunder. For instance, we find Ribot quoting with entire approval the following passage from E. von Hartmann: "When I have pain in my teeth or my finger or my stomach; when I lose my wife, my friend, or my situation, if in all these cases we distinguish what is pain and pain alone, and is not to be confounded with sensation, idea, or thought, we shall recognise that this special element is identical in all the cases."[1] And Külpe says: "There is no qualitative difference discoverable between the pleasantness of colour and that of a successfully concluded argument, when careful abstraction is made of the very wide differences in all the attendant circumstances."[1] All such statements involve the logical blunder of putting forward *a statement about the meaning of an abstract term* as if it were *a statement about facts.* To say that there is no difference in kind (for example) between the pain of a great grief and the pain of toothache, is only to say that the abstract term, pain, means the same thing in the two cases; in fact, it is only to say that the abstract term has a definite and fixed meaning,—that "pain is pain." But the *abstractions*, pleasure, pain, do not exist. The pleasures and pains which do exist have special characters due to the psychological and physiological context in which each occurs.

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[1] Ribot, *Psychology of the Emotions*, p. 42.

Alice in Wonderland met with a cat whose countenance invariably wore a "grin"; and this cat was liable to vanish suddenly. On one occasion, however, the cat "vanished quite slowly, beginning with the end of the tail, and ending with the grin, which remained some time after all the rest of the cat had gone." What is possible in the world of "Wonderland" is not possible in any other world. In the world of mental life, a pleasure or a pain can be distinguished from its context, but when so distinguished it has no existence, any more than in the physical world a "grin" exists abstracted from a "cat."

We have seen in the last chapter that even the pleasures and pains of comparatively simple sensations have special characters and qualities owing to the diffused physiological effects aroused by the stimulus. At higher levels of mental life, new factors enter into the "context" of the feeling; and every actual feeling or emotion, above the level of organic sensation, is dependent on some group of primary or revived presentations, which, together with the reactions of organic sensation and the induced movements of attention, gives to the feeling a specific quality of its own. Hence—to return to our previous illustrations—the "pain of a toothache" and the "pain of a great grief," or the "pleasantness of a colour and that of a successfully concluded argument," do really differ in mental quality; because "the very wide differences in all the attendant circumstances" do really make a difference in the pain, or in the pleasure, as the case may be.

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[1] *Outlines*, p. 231.

This is not to make "an ethical valuation unjustifiably determine a psychological conception" (Höffding, p. 221). The distinctions of quality, on which we have insisted, are psychological facts. It is possible that some of them may be capable of an ethical interpretation; but that is hardly a reason for denying their existence. It is, of course, no business of psychology to make such interpretations.

It is true that one element is present (in various forms) in every feeling, and enters into its formation—the internal sensations. If it is meant that *for this reason* all pleasures are identical in the affective quality, and all pains, this is to say that the internal sensations are the whole of the affective quality in every feeling. Such an opinion would seem to be a mere dogma. It does not follow that because the internal sensations help to form the special character of an affection, they are therefore the whole of the affection.

§ 2. *Structure of emotion; resulting problems.*—In order to understand the component factors of an emotion, and the psychological problems to which they give rise, we take as an example the case of *fear*, which we analyse, taking it at a stage of mental growth represented by the adult human mind.

We first quote from Charles Darwin an account of the bodily symptoms of fear.[1] "The eyes and mouth are widely opened, and the eyebrows raised. The frightened man at first stands like a statue, motionless and breathless, or crouches down as if instinctively to escape observation. The heart beats quickly and violently, so that it palpitates or knocks against the ribs; but it is very doubtful whether it then works more efficiently than usual, so as to send a greater supply of blood to all parts of the body; for the skin instantly becomes pale, as during incipient faintness. This paleness of the surface, however, is probably in large part or exclusively due to the vaso-motor centre being affected in such a manner as to cause the contraction of the small arteries of the skin. That the skin is much affected under the sense of great fear, we see in the marvellous and inexplicable manner in which perspiration exudes from it. This exudation is all the more remarkable, as the surface is then cold, and hence the term "a cold sweat"; whereas the sudorific glands are properly excited into action when the surface is heated. The hairs also on the skin stand erect, and the superficial muscles shiver. In connection with the disturbed action of the heart, the breathing is hurried. The salivary glands act imperfectly; the mouth becomes dry . . . One of the best marked symptoms is the trembling of all the muscles of the body; and this is often first seen in the lips. From this cause, and the dryness of the mouth, the voice becomes husky or indistinct, or may altogether fail: *obstupui, steteruntque comæ, et vox faucibus hæsit.* . . . As fear increases into an agony of terror, we behold, as under all violent emotions, diversified results. The heart beats wildly, or may fail to act, and faintness ensues; there is a death-like pallor; the breathing is laboured; the wings of the nostrils are widely dilated. . . . The uncovered and protruding eyeballs are fixed on the object of terror, or they may roll restlessly from side to side. The pupils are said to be enormously dilated. All the muscles of the body may become rigid, or may be thrown into convulsive movements. The hands are alternately clenched and opened; the arms may be protruded, as if to avert some dreadful danger, or may be thrown wildly over the head. In other cases there is a sudden and uncontrollable tendency to headlong flight."

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[1] If the account seems exaggerated, the reader should remember that in civilisation it is possible to pass through life without any experience of genuine fear. Professor James remarks that many of us would need an attack of mental disease to teach us the meaning of the word. The passage is from Darwin's *Expression of the Emotions*, 2nd ed., ch. xii. (pp. 306-309 of the popular edition).

The *object* of the emotion of fear (that is, its exciting cause, to which it has reference) is a situation in which the individual finds himself, and which is *perceived or imagined to be* one of impending or imminent evil or disaster.

Its *bodily symptoms*, as described above, arise from a withdrawal of energy from the organic processes (and from some muscles—*e.g.*, those of the jaw and lips), and the concentration of energy on muscular movements and certain intellectual processes; hence occurs a pervading shock of internal depression.

On the *mental side* there is first of all a central process—the perception or idea of myself in this situation. The volitional energy is concentrated in the muscular movements and in an intense occupation of the thoughts with the dreaded situation (*i.e.*, on the perceived objects and the allied ideational trains). We are affected with a massive pain, due to a combination of feelings of abnormal internal depression and abnormal excitement. Other more purely mental pains supervene owing to the conflict of these elements of thought, volition, and feeling.

Every emotion has the two sides, bodily and mental. We can distinguish the following factors in the emotion :

On the mental side :

(*a*) the perception (or imagination or memory) of a situation in which the individual finds himself, and which affects his material, mental, social, or higher interests.
(*b*) an affective quality, tending towards pleasure or towards pain.[1]
(*c*) a tendency to activity.
(*d*) a complication of organic feelings.

On the bodily side :

(*e*) diffused internal changes, cf. (*d*) above ;
(*f*) muscular movements, cf. (*c*) above.

The factors (*a*), (*b*), (*c*), (*d*), are elements in, or aspects of, a single state of consciousness which, as a whole, is called an emotion. They are not all equally prominent in every emotion. The most intimate connection of the emotion with the body occurs through (*d*) and (*e*). The bodily factors (*e*) and (*f*) are together called the *expression* of the emotion. The expression of the emotion is in psychology understood to mean *all* the bodily changes that occur in connection with it; facial expression is only one part of it, and concerns the facial muscles alone.

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[1] We say "tending towards," in order to cover the case of emotions which may arise without definite affective quality—*e.g.*, surprise.

The following problems occur in the psychology of the emotions:—

(1) The question whether emotions differ in mental quality; with the related question of distinguishing emotion proper from what has been called "sentiment" (emotional disposition);
(2) the relation of emotion to its so-called expression;
(3) the development of emotion and of its expression (involving finally the question of the evolution of mind in general).

§ 3. *Emotion and sentiment.*—We have already defended the view that emotions differ in mental quality according to the different levels of mental development at which the emotions occur, as well as in other ways (§ 1).

We may now add that the extent and intensity of the effects on the internal organs and the consequent organic sensations differ with different individuals. But there are certain emotions where the organic reactions are nearly always comparatively vigorous. These have been called (by Professor James and others) the "coarser" emotions: anger, fear, love, hate, joy, grief, shame, pride, and their varieties (which are numerous). When the effects on the internal organs are comparatively weak, we have what the same writers have called the "finer" or "subtler" emotions: especially the intellectual, æsthetic, ethical, and religious feelings, and their varieties —*e.g.*, moral satisfaction, thankfulness, curiosity, relief at getting a problem solved, reverence for what is higher in the moral scale. This distinction of "finer" and "coarser" emotions seems really of no use or importance save as leading naturally to the distinction between *sentiment* and *emotion ;* for the so-called "finer emotions" turn out to be "sentiments."

It is extremely important to distinguish between what Professors Stout and Baldwin have called "sentiment" (in a technical psychological sense) and emotion. The emotion is the feeling at the time it is felt; the sentiment is the emotional disposition out of which it arises. The simpler forms of sentiment produce only one kind of emotion; in its more developed forms the same sentiment can produce many kinds of emotion. It is, to begin with, a psychological disposition (ch. iii., § 5) towards a certain object. It shows itself in different ways according to the relations into which that object may enter. Hence (*a*) it cannot be all felt at once, and (*b*) it requires the development of ideation (memory, imagination, knowledge). Thus, *friendship* is a highly developed sentiment. It is "a general susceptibility to manifold kinds of emotion varying with circumstances; it is manifested in the *sorrow* of parting with one's friend, the *joy* of meeting him after prolonged separation, *jealousy* of those who engross his interest so as to exclude us from it, *hope* for his success, *fear* when he is in danger, *anger* against his enemies."[1] All these emotions belong to the sentiment of friendship, but they cannot all be felt at once. The sentiment itself might be described as the permanent *condition* of these varying phases of emotion. Friendship is an example of an acquired disposition. In ordinary language, the words "love" and "hate" stand for acquired dispositions of this sort. A comparatively simple sentiment or emotional disposition is the result of frequent indulgence in a particular emotional state, as anger. This fixes and strengthens an emotional habit,—a disposition to that mode of feeling.

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[1] See Baldwin, *Dictionary*, vol. ii. p. 521.

The intellectual, ethical, æsthetic, and religious emotions are the manifestations of deep-seated and complex sentiments which are characteristic and distinctive of human life. In a suggestive passage Höffding shows the importance of these: "A feeling may be very strong and deeply-rooted without being violent, but is then more easily overlooked. The feelings accompanying ideal aims and relations are far less in a position to produce momentary effects and sudden ebullitions than are the primitive feelings accompanying the physical vital functions. In the passions associated with self-preservation and the propagation of the race there lies an animal ardour which is often beyond the control of all other influence. Ideal feelings are spread over a larger space of time, and take effect more secretly. And yet they are capable of possessing themselves step by step of the central position in the mind, and of employing in their service the accumulated energy originally under the control of those primitive impulses."[1]

§ 4. *Emotion and habit.*—We remarked above that by habitual indulgence in an emotion we may establish a *disposition* to feel it. We also observed in the previous chapter that "custom blunts feeling." These statements do not conflict; for the latter has reference only to the case where the pleasurable or painful circumstance is an approximately constant element in our life, without the freshness that periodic cessation and recurrence can bring. "Our permanent surroundings and manner of life tend to grow indifferent—that is, to lose all or most of their affective concomitants." This "gradual abatement of feeling with permanence and custom" is notably illustrated in the case of emotion. In this connection Mr Sully refers to the blunting of the sentiments of delicacy and horror in such cases as the gravedigger in *Hamlet* or the sexton in Scott's *Bride of Lammermoor*, and to the known effects of the frequent shaming or ridiculing of children in producing obtuseness of sensibility.[1]

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[1] *Outlines*, p. 95.

This possibility of growing indifferent to *permanent circumstances* does not conflict with the fact that by the indulgence of feeling habits of feeling may be formed, just as habits of conduct may be by bodily actions. Hence it has been said that "feeling is the conservative element in mental life." But all such generalisations are unsafe. The "ideal feelings" or sentiments referred to at the end of the last section (§ 3) are progressive as well as conservative; they lead to the acquisition of new material as well as the retention of the old. But there is no doubt that sometimes a feeling will not expand beyond its original object, and so brings about a kind of *inertia* in mental life, which in special cases helps to retard and hinder progress in thought and life.

A feeling may persist after its original object has ceased to exist. Thus, an emotion of remorse may continue to follow on certain actions, even after a fully rational examination has convinced us that they are morally innocent; a sentimental regard may keep us attached to institutions after we know them to be worthless, or to persons after we know that they have utterly ceased to deserve it. More innocent forms of the survival of former feelings also are constantly found. When meeting one's old schoolmaster, after many years, one almost unconsciously feels a survival of the former regard,—one feels a kind of deference which is not strictly required in the new circumstances. In the closing scene of *The Mill on the Floss*, George Eliot has inserted a touch showing how the old feeling of child-comradeship between Tom and his sister returns, together with the unpremeditated use of the old pet name: "It was not until Tom had pushed off and they were on the wide water—he face to face with Maggie—that the full meaning of what had happened rushed upon his mind. It came with so overpowering a force—it was such a new revelation to his spirit, of the depths in life that had lain beyond his vision, which he had fancied so keen and clear—that he was unable to ask a question. . . . But at last a mist gathered over the blue-grey eyes, and the lips found a word they could utter: the old childish 'Magsie!' . . . The boat reappeared, but brother and sister had gone down in an embrace never to be parted: living through again in one supreme moment the days when they had clasped their little hands in love, and roamed the daisied fields together."

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[1] *Human Mind*, vol. ii. p. 34.

That feeling even on the ordinary levels of mental life is not merely conservative, may be illustrated by pointing out its effect in impelling the thoughts beyond the limits dictated by fact. Thus a particular emotion may (as it were) persist in seeking further food for itself, and so lead us to over-estimate or under-estimate the whole character of a person, or the whole meaning of a course of events, simply because some particular detail affects us in a special way. What is called the "idealising effect of feeling" is a noteworthy illustration of this tendency, but at a level where the mere charge of "illusion" is not applicable; thus, practical and ethical interests may prompt the formation of the image of an ideal world from which the imperfections and sufferings of the actual world are removed.[1]

§ 5. *Emotion and its expression.*—Charles Darwin, in his book on *The Expression of the Emotions*, assumed the view of common-sense, that the emotional state causes the expression. The facts are, however, more complex than is recognised by common-sense, which is before all things practical rather than scientific. Thus, it is well known that by *voluntarily assuming* the muscular movements which form part of the "expression" of an emotion, we put ourselves into a state highly favourable to the occurrence of the emotion, if we do not thereby actually arouse it to some extent; and, on the other hand, we at least partly suppress the emotion by suppressing those factors in its "expression" which are under voluntary control. This is evidently true in the case of the so-called "coarser" emotions (§ 3 above)—anger, fear, pride, &c. And with regard to the internal sensations which form the remaining part of the "expression," it is well known that changes in organic feeling, produced by illness or disease, have a great effect on the emotional life.[2] It would seem then that the "expression" is *part of the cause* of the emotion.

Recent discussion of the relation of emotion to its expression has largely turned on the opinion advocated by Professor James: "Common-sense says, we lose our fortune, are sorry and weep; we meet a bear, are frightened and run; we are insulted by a rival, are angry and strike. The hypothesis here to be defended says that this order of sequence is incorrect, that the one mental state is not immediately induced by the other, that the bodily manifestations must first be interposed between, and that the more rational statement is that we feel sorry because we cry, angry because we strike, afraid because we tremble; and not that we cry, strike, or tremble because we are sorry, angry, or fearful, as the case may be."[1]

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[1] The influence of feeling on cognition is carefully discussed by Höffding, pp. 298-307.

[2] See concluding paragraph of this section.

Stated less paradoxically and more accurately, this means that the emotion is the *mental symptom of* the bodily changes which constitute the so-called expression; the movements and internal processes take place, and are "reported to the brain," giving rise to the emotion in its feeling-aspect. If this were true, it would mean that an emotion is nothing but a perception (or idea) *plus* sundry muscular or organic sensations.

We have already emphasised the view that from the level of special sensation upwards, feeling is never *merely* organic sensation, though it is always qualified by organic sensations. This applies to emotion in the same way. It is certainly true that the organic sensations are a real factor in the emotion; but even granting that they are a very essential factor, it does not follow that they are the only essential factor or that they are the whole of the feeling. They form part of the total experience which gives the emotion a quality of its own;[2] but they are not the only factor which does so. Each of the factors (*a*), (*b*), (*c*), (*d*) does so (see § 2, above); the emotion being a *single whole*, of which these are various features or elements.

The only approach to direct evidence that James offers in support of his view is a kind of introspective experiment: "If we fancy some strong emotion, and then try to abstract from our consciousness of it all the feelings of its bodily symptoms, we find we have nothing left behind . . . out of which the emotion can be constituted, and that a cold and neutral state of intellectual perception is all that remains. . . . What kind of an emotion of *fear* would be left if the feeling neither of quickened heart-beats nor of shallow breathing, neither of trembling lips nor of weakened limbs, neither of goose-flesh nor of visceral stirrings, were present, it is quite impossible for me to think. Can one fancy the state of *rage* and picture no ebullition in the chest, no flushing of the face, no dilatation of the nostrils, no clenching of the teeth, no impulse to vigorous action, but in their stead calm breathing, limp muscles, and a placid face?"[1]

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[1] James, *Principles of Psychology*, vol. ii. pp. 449, 450.

[2] "There are infinite shades and tones in the various emotional excitements which are as distinct as sensations of colour are" (James, *Psychological Review*, vol. i., No. 5, p. 525); cf. § 1, above.

We must again insist that, even if we cannot imagine the emotion *apart from* the feelings of its bodily symptoms, it does not follow that the latter are the whole of the emotion. On the contrary, we may reply that it is in the highest degree improbable that they are the whole of it, for a reason that appears when we ask: "What place (on James' theory) is given to the *perception or imagination of the situation*, which is the real ground of the whole emotional state?" The emotion arises because this situation is one where some interest of the individual is vitally affected. The recognition of this is a *mental disturbance*, a disturbance of ideas and conative tendencies, which are not organic sensations; this mental disturbance arouses feelings of itself. And this mental disturbance is the starting-point of the emotion. You see your friend in danger; and your recognition of the situation and its possibilities is an instance of the kind of mental disturbance of which we speak. It calls into play ideas and active tendencies which are connected with a diffused bodily disturbance, and the latter in its turn reacts on the mental state, adding a complication of organic sensations to the total state of consciousness called the emotion. Hence the "expression" is the cause of one feature of the emotion, not the whole of it.[1]

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[1] *Text-book of Psychology*, p. 279.

In the so-called "finer" emotions, where the effect on the internal organs is comparatively weak, Professor James can only apply his theory by refusing to call them emotions, and treating them as purely intellectual states. And when this is evidently not the case, when there is evidently a real affective quality, he speaks of "the thinness and paleness of these feelings when unmixed with bodily effects," observing that "in all sentimental and impressionable people" the bodily effects mix in: the voice breaks and the eyes moisten when the moral truth is felt, &c.; whenever there is anything like *rapture*, however intellectual its ground, we find these secondary processes ensue.[2] In the same strain M. Ribot—an enthusiastic advocate of James' theory—gives examples of the strong bodily reaction involved in religious, intellectual, and similar emotions when in their most violent form, and then contents himself with saying *ex cathedra* that in the absence of such bodily reactions there is no emotion or feeling! We must insist that this way of testing the "strength" of an emotion is illusory. No doubt to introspection the intensity of a feeling seems to vary with the amount of organic and muscular excitement connected with it. But its real strength is to be tested by its capacity to influence and mould rational conduct (not by any ebullitions of pleasure and pain, nor by any "bodily reverberations" of organic feeling or muscular excitement). From this point of view an emotional disposition or sentiment, which in its entirety cannot be "felt" at all, is stronger than the transient emotions which engendered it, because it has a deeper and more penetrating influence on rational life (cf. § 3, above).

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[1] In ch. v., § 9, we reserved to ourselves the right to use the language of "interaction" as well as that of "parallelism" whenever convenient.

[2] James, *Text-book of Psychology*, p. 284.

It is not for a moment to be denied that bodily states may be directly productive, not of an emotion, but of an emotional "mood" which is ready to fasten on anything, real or imaginary, and make it an object for the corresponding feeling. The "mood" is not an emotional *disposition*, for it is a fact of consciousness all the time. A painfully familiar and typical example is the "irritability" or "bad temper" which is due to bodily causes. We have already remarked that the central nervous system and the various vital processes of the body are connected in two ways: by nerves which are stimulated by these organic changes, and also more directly,—in particular, by the character and amount of the blood-supply. Hence, for example, an attack of dyspepsia or a bad night may produce an unhealthy condition of the nervous system which is felt as a state of irritability; or the use of drugs or stimulants may produce an unhealthy state of hilarity. Such "moods" are *slight* forms of morbid emotions which may assume very serious proportions in mental disease; their practical mischief lies in this, that they always tend to make the person look for or invent objects and occasions on which the emotion may fasten itself. They may be "groundless" but never "objectless." Ribot makes the mistake of speaking as if these were actual emotions occurring without any perception or ideation. They are emotional moods, and they insist on finding objects.

On the relation of emotion to its expression, see James,* *Text-book of Psychology*, ch. xxiv.; Sully,* *Human Mind*, vol. ii., ch. xiv., §§ 10, 10*a* (criticism of James); Stout,* *Manual*, bk. iii. (i.), ch. iv., § 2 (fuller criticism). Also: James, *Principles*, vol. ii., ch. xxv.; Ribot, *Emotions*, pt. i., ch. vii. (supports James' theory); Dewey, *Psychological Review*, vol. i. p. 553, vol. ii. p. 13 (carries James' theory farther). For further criticisms, see Ward, suppl. art. "Psychology," *Ency. Brit.*, vol. xxxii., p. 65; Mellone, *Philosophical Criticism and Construction*, ch. iv., pp. 245-250. Professor James has modified his original statements; see *Psych. Review*, vol. i. p. 516, and short papers by Marshall, Stratton, and Irons, *Psych. Review*, vol. ii. pp. 57, 173, 279.

§ 6. *Development of emotion.*—The problem of the evolution or development of the emotional life is at bottom part of the general problem of mental evolution in the history of animal and human life. It is not open to doubt that there has been such a development: that in the beginning all forms of life were alike, and were the simplest and least organised forms; that they gradually diverged and grew more and more different from one another and more and more complex in themselves, until they attained the almost infinite variety that we now find; that, implicated in this process, there has been a like gradual development and increasing complexity of mental life; that the human race takes its place in this process, and, in virtue of mental development, now represents its most advanced stage. This is an abstract statement of what happened, and it says nothing as to the causes or operative factors which brought about the process. Darwin's great contribution to the question was to prove the importance of "natural selection" as *one* of these factors. As soon as we begin to press the question of the origin of emotion and expressive movements, we are driven back to the question of the factors of biological and psychological evolution. It is not consistent with the plan of this book to raise these questions.[1]

We can, however, raise a question more limited in its bearings: What are we to understand by the evolution of feeling within the limits of the individual life (from early infancy onwards)? The general answer to this question has already been given (refer to ch. ii., § 4). In studying the "development" of the individual mind, we are studying the characteristics of the facts of mind in their natural chronological order, as gradually more complex forms appear. In its application to feeling, this means that we can aim only at analysing each higher form of feeling as it emerges, and observing the order in which these forms emerge. This *time-order* is really the only principle of connection between "higher" and "lower" forms of feeling which is known; and this is the only meaning to be attached to such statements as that of Höffding: "It is possible that the 'tone' of the sensation, or the way in which it immediately affects our frame of mind, may psychologically be a germ, out of which the higher feelings are developed."[2]

Writers who attempt to "explain" the evolution of feelings in the individual life, usually conceive the problem thus: *Given* certain primary or fundamental emotions, it is required to derive all other forms from these by certain principles. These principles may be reduced to two: (*a*) "the law of transference," (*b*) "the law of combination, coalescence, or fusion."

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[1] See Mellone, *Philosophical Criticism and Construction*, ch. v., pp. 303-310 (on biological theories of evolution); cf. *ib.*, pp. 282-291.

[2] *Outlines*, p. 222.

(*a*) The "law of transference" is a real fact in the emotional life. Great stress was laid on it by the English School of Psychologists (especially Hartley, Bain, and Mill): but its range has been greatly exaggerated. It refers to the transfer of feelings to things that did not originally excite them. The feeling originally excited by an object spreads over to other objects *associated with* this one; and soon these other objects suffice of themselves to arouse the feeling, without a thought of the original one. The association may rest simply on the fact that we have experienced them, or been interested in them, together;[1] or it may rest on resemblance. An important special case of the former type is the transference of the interest from an *end* to the *means*. The case of avarice is a trite illustration. In its extreme form, the miser is said to feel for the money, and for the money alone, the desire that should belong to the pleasures, power, and influence that the money could procure. In the special case of *resemblance* the emotion may act unconsciously. Lehmann has shown the effect of this in the so-called "instinctive" likes and dislikes which are a common experience.[2] There is, in many such cases, a resemblance to some other person whom we have liked or disliked for ordinary reasons: this experience, though forgotten, has left traces in the mind which tinge with pleasant or unpleasant feeling the new and similar experience. A mother may feel a special sympathy for a youth who is like her lost son, and yet be unaware of the reason. "Instinctive" fears and aversions have often a like origin.

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[1] Cf. Bain, *Mental and Moral Science*, pp. 104, 106.

[2] *Hauptgesetze*, pp. 244, 245.

This influence of subconscious or unconscious resemblance in the development of feeling is of real importance, for by means of it feeling may spread very widely. The expansion of feeling by this means is illustrated on a great scale in the history of the race, in the widening of *fellow-feeling* or *sympathy*, until it includes not merely the clan or patriarchal group, but the tribe, the nation, the race.

(*b*) The so-called "combination," "coalescence," or "fusion" of feelings is a principle so vaguely conceived by those who appeal to it that its value is very slight. In a sense, "combination" is coincident with the whole course of mental development; for just as mental states may acquire a relative independence and self-subsistence, so they may lose it and combine into a larger whole. But what exactly takes place in this "combination"? Bain says that it "originates new states which acquire a permanent and generic form, wherein the simple elements cease to be apparent." If so, the new state is not a combination of the simpler states; it is related to the simpler states only in that their appearance must have preceded its appearance. The simpler states are not the complex one, and the complex one is not the simpler ones, but something new and something different. All that is meant by such phrases as those quoted from Bain is that there is an ascertainable order of appearance in the processes, the simpler before the complex.

A further point of importance in the application of what we have said above to emotion is this: when particular feelings combine to give rise to a new feeling, the new feeling is not only qualitatively distinct from its "constituents," but the latter may continue to exist alongside the former as distinguishable states. Wundt has pointed this out clearly (*Human and Animal Psychology*, Eng. trans., pp. 219-221): "Every feeling is a qualitatively simple and undecomposable mental state. This fact does not, of course, exclude the fact of there being in consciousness several simultaneous feelings; only, these simultaneous feelings always combine in a *total feeling* which possesses a unitary character, and cannot therefore be regarded simply as the sum of the original particular feelings. . . . [When] opposing feelings alternate with each other in rapid succession, there is a continuous modification of one affective phase by the other, so that a new feeling with a characteristic quality of its own arises alongside of the primary changing feelings. Its quality is, of course, dependent upon those of the original feelings; but it cannot be analysed into them. . . . We have an example of this from the sense-feelings in tickling, and from the intellectual feelings in doubt [mental dissension]; while the dissonance of two clangs may be taken to exemplify it in the field of the elementary æsthetic feelings. . . . [Again, in the common vital feeling (ch. viii., § 1) or *coenæsthesia*], the entire sum of separate organic feelings combines to form a complex unity, the trend of which finds its expression in a resultant total feeling. Similar total feelings with accompanying particular feelings constitute the higher intellectual, æsthetic, and moral feelings. In all these cases every particular feeling and every total feeling has its own characteristic quality, in virtue of which they stand in relations of agreement and disagreement to other feelings, though they are never analysable into them. So that nothing can be more erroneous than the opinion sometimes held that the entire world of feeling is composed of a certain sum of elementary feelings—perhaps sense-feelings—of approximately constant quality. The essential characteristic of feeling, especially of the higher feelings, is rather an inexhaustible wealth of qualities; new qualities arise from the mutual influences of simultaneous feelings and from the induction of present by antecedent feelings."

Even when we endeavour to arrange the typical emotions in their "natural history" order of appearance, our results are very general in character; no precision of detail can be arrived at. We can distinguish three stages:—[1]

(1) First, certain emotions which have acquired distinctive names in ordinary life; which civilised man has in common with the savage and many of the animals nearest to him in the zoological scale; and which have characteristic bodily expressions which occur whenever the emotion occurs (*e.g.*, the *trembling* of fear). Examples of this stage are found in most of the so-called "coarser" emotions referred to above (§ 3). Their characteristic manifestations may appear very early in human life. They involve perception (of some situation which arouses the emotion), and themselves are modified according to the development of the capacity of perception, and the mingling of ideational elements with perception; so that any one of these emotions may occur at different levels of mental development.

(2) The next stage is represented by the emotions arising from an imaginative reinstatement of the original causes of the feeling; in other words, they are the manifestation of emotional dispositions and sentiments. All the emotions included in the first group can reappear at this higher level (modified accordingly); but the most important feeling of this type is Sympathy. Sympathy is usually explained as "the imaginative entering into others' feelings through recalling our own similar experiences" (Sully), or in words to that effect.

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[1] The arrangement here given is in part the same as that given by Mr Sully, *The Human Mind*, vol. ii., ch. xiv., § 26. We do not, however, include "the general feeling of happiness and misery" under the head of Emotion.

Owing to the development of Sympathy the emotions may be extended, may arise not only through what happens to self but what happens to others: through the operation of Sympathy we feel anger, joy, fear, &c., *for another.*

(3) At a level of mental life which *presupposes* the development of Sympathy and of the emotions included under the two previous groups, we have the sentiments and emotions which attach themselves to the great common aims and ideals distinctive of human nature —Truth, Beauty, Goodness.

§ 7. *Memory of pleasures and pains.*—Connected with the question of the development of feeling is that of the "memory of feeling" and the meaning of this term. This question concerns the affective quality —pleasure or pain—and that alone. It is generally admitted (by all psychologists who do not identify pleasure and pain with organic sensation[1]) that we cannot have a *memory-image* of a pleasure or pain as we have of a past perception. What really happens is this: either (*a*) we remember the *fact that we have felt* pleasure or pain of such and such a kind (having no mental image of it), as when we remember, of the incidents in a long journey, only the places where they happened, the details, and the fact that they were once disagreeable; or (*b*) a vivid memory-image of the original circumstances arouses an affection *like* the former one (usually much less intense); as when a Parisian, having "in the mind's eye" such a memory-picture of Paris and the close of the siege and the entry of the Germans, after thirty years experienced the same emotion afresh. We must be utterly absorbed and buried in memories if the memory-images are to excite an affection whose intensity is comparable to the original one. People differ very much in both respects (*a*) and (*b*); some have a very defective memory even for the past pleasant or painful qualities of a past experience of their own; many more never find that the memory-images excite any present feeling. Höffding observes that only in individual cases, which are almost pathological, the fresh feeling that accompanies the remembrance seems to be the very same as in the original experience. "Littré mentions a striking example from his own experience. At the age of ten he lost a little sister under specially sad circumstances, and had felt great sorrow about it. 'Mais le chagrin d'un garçon ne dure pas beaucoup.' He always, however, preserved a lively recollection of the event, although the freshness of the pain had gone. Then in old age he felt again suddenly, without any special occasion, the same pain. 'Tout à coup, sans que je ne le voulusse ni le cherchasse, par un phénomène d'automnésie affective, ce même évènement s'est réproduit avec une peine présente non moindre, certes, que celle que j'éprouvais au moment même, et qui alla jusqu'à mouiller mes yeux de larmes.' This was frequently repeated in the course of several days, after which it ceased and gave place to the customary remembrance."[1] When the poet says that "sadness departs upon the wings of time," part of his meaning, expressed in psychological terms, is that a memory corresponding to type (*b*) is gradually transformed into one corresponding to (*a*).

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[1] See ch. viii., § 4 (concluding paragraph).

What sometimes happens is, that the affective quality of a memory-image is interfered with or overborne by the actual experiences in the midst of which it occurs;

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[1] Höffding, *Outlines*, pp. 241, 242.

for the same reason its affective quality may even be reversed. I may remember a certain experience, and also remember that it *was* pleasant, while the memory-image of it may *now* be unpleasant. This is notably the case, sometimes, in our memories of past indulgences in sense-pleasures.

We have seen that there is a revival of emotion through the formation of emotional dispositions; but this is a different question from that of the revival of pleasure and pain. An emotion is not merely one aspect of (or element in) a whole concrete "state of mind"; it is a "state of mind" itself, with a certain independence of its own. Pleasure or pain is at most only one aspect of it, and usually a variable aspect.

This question of the "revival" or "reproduction" of pleasure and pain depends at bottom on what we mean by "revival" and "reproduction" in the case of ideas. It is through neglect to consider the importance of this that Ribot's elaborate discussion (pt. i., ch. xi., pp. 140ff), though valuable in itself, is largely irrelevant to the precise question. Those who reject the alleged "revival" of Affection sometimes say that "a new feeling is called forth by the old presentation." But what do we mean by the "old presentation"? Presentations do not have a bodily subterranean existence and bodily resurrection. Strictly speaking, no presentation is retained *as such;* what is retained is a psycho-physical disposition which, under favourable conditions, brings about the appearance of a new presentation *like* the old one. Instead of saying that a new Affective quality is called forth by the old presentation, we should say that a new Affective quality is called forth by the new presentation. The difference between the mode of occurrence of the former and that of the latter is that the bond of identity which holds in the case of the presentation (by which the new presentation is like the old one) does not hold in the case of the Affective quality, as noted above.

§ 8. *Classification.*—A classification of the emotions on scientific principles would have to take account either of a general characteristic of the emotional state as a whole, such as intensity or duration; or of some one of the essential constituent factors of the emotion —*i.e.*, (*a*) organic feelings; (*b*) muscular movements; (*c*) affective quality; (*d*) exciting object (perceived situation).

If we attempt to arrange according to *intensity* of the emotional state as a whole, various series may be constructed according to different types of emotion, which vary in degree; thus:—

I.	II.	III.	IV.
enthusiasm,	rapture,	despair,	rage,
admiration,	joy,	grief,	anger,
respect.	content.	melancholy.	ill-humour.

An arrangement according to *duration* would lead simply to a naming of various stages through which an emotion may pass in becoming a *mood* or a *disposition.* The same remark applies in part to the arrangement, according to degrees of intensity, illustrated above. Any emotion may give rise to an emotional disposition of the same type by being directed habitually on the same object. We have already called attention to this, and pointed out that the emotional dispositions and sentiments thus acquired are *of greater power* than the original special emotions which engendered them; "power" being measured by capacity to be a motive to rational conduct (as when love for a particular individual determines a great part of a person's plan of life). Hence a classification according to *conscious* intensity may be merely illusory.

An appeal to any of the essential constituents of emotion, as a basis of division, does not lead to any definite results. The muscular movements are so variable as to be out of the question as a basis. The organic feelings afford only the vague distinction of "exciting" (or "animating") and "depressing" emotions. The affective quality affords another vague distinction, of "pleasant on the whole," "painful on the whole," "neutral on the whole." If we combine these two divisions, we get an arrangement like the following (here two or three examples under each head are given) :—

animating, pleasant : joy, hope, pride.
animating, unpleasant : anger, fear.
animating, neutral : surprise, expectation (on its feeling-side).
depressing, unpleasant : grief, despair, shame.

There remains the question of classification according to the object of the emotion ; but it is clear that we cannot classify all the kinds of situation which call forth emotion. The conclusion is that no scientific classification of the emotions is possible in the present state of our knowledge.

On the classification of the emotions, see Sully,* *The Human Mind*, vol. ii., ch. xiv., §§ 25, 26, and "Appendix J"; Bain, *The Emotions and the Will*, ch. iii. and "Appendix B"; Mercier, *The Nervous System and the Mind* (also in the old series of *Mind*, vols. ix. and x. ; No. 35, July 1884, No. 36, Oct. 1884, and No. 37, Jan. 1885).

§ 9. *Fear*, *anger*.—The reader will remember (§ 6) that we distinguished three stages in the unfolding of the emotional life : first, the "instinctive" and "animal" emotions (as they may be called), excited by percepts ; second, sympathy and other emotions excited by the *idea* of their objects; third, sentiments attaching to truth, beauty, goodness. We also pointed out that the same emotion may occur at different levels of mental life, modified by the development of ideation and other processes; some forms of anger or fear, for instance, belong to the first group, others to the second.

In describing any emotion, the following points should be attended to:—

(1) The nature of its object (the kind of situation which, when perceived, imagined, or remembered, arouses it).

(2) Its affective quality: pleasant, painful, or practically indifferent; the massiveness or volume of the affection; its normal intensity.

(3) Mode of influencing the will (active tendencies involved).

(4) Bodily expression: (*a*) internal organic sensations, (*b*) muscular movements.

(5) Different modifications of the emotion (if any) at different stages of mental development.

In the remainder of this chapter we shall select a few typical emotions, and point out their more important characteristics. The bodily expression is of special importance only in the emotions belonging to the first of the three groups in the arrangement which we have given.

(i) *Fear.*—The description of this emotion given above (§ 2) corresponds in the main closely to its "instinctive" or "animal" type. It is the immediate outcome of a practical situation, as described above,—a situation which (it has been well said) involves "an imperative demand for practical adjustment in view of an emergency, together with more or less of felt incapacity to deal with the situation effectively." Professor Stout has pointed out that fear arises not only in connection with imminent evil or disaster, but also from "the startling or disconcerting effect of a strange, sudden, or violently obtrusive occurrence." The fear arising from the presence of a supposed apparition from another world is entirely of this kind.

When the cognitive processes are in an elementary state, because they are undeveloped (as in the animal, the savage, or the normal child), or because they are suppressed (as in some wild passion of fear, such as rarely occurs), the instinctive bodily manifestations of the emotion may be of overwhelming force. Rudyard Kipling, describing one of the sudden panics to which even British troops are liable, makes one of the fugitive soldiers say—

> "Till I 'eard a beggar squealin' out for quarter as 'e ran,
> An' I thought I knew the voice—an' it was *me!*"

This represents a falling back into the purely instinctive passion of fear in all its intensity, as when a frightened dog runs and yelps—a passion which the distinctively *human* consciousness in the man only becomes aware of by its bodily symptoms when he recognises the sound of his own voice.

Corresponding to the level of the second group, is the more intellectualised form of fear which is contrasted with hope, and which involves distinct memory and imagination. It is the *expectation* of evil. It implies a high degree of assurance (short of the highest) that some undesired event is likely to occur, or that some desired event is unlikely to occur, "as in the chances of a storm, a severe illness, an unequal contest for a great stake." The organic reactions and mental distraction make this a dangerously depressing force, which itself helps to incapacitate us for successful struggle against the impending danger.

Hope and Despair likewise depend upon our expectation with regard to future events. Hope depends on a degree of assurance (short of the highest) that some desired event is likely to occur. Despair is the emotion excited by a very strong assurance as to a coming painful event. If the character of our expectation changes, the emotion changes accordingly.

(ii) *Anger* is characterised by a tendency to *break down opposition*, whether the opposition consists in the direct infliction of pain or injury, or in hindrances being put in our way or difficulties made,—real or imaginary. The characteristic attitude of Anger is *active resistance and aggression*, while that of Fear is flight or helplessness. This emotion, like Fear, can be manifested at every stage of mental development, modified by the growth of the fundamental functions of mind. When the cognitive processes are in an elementary state, the emotion appears as an impulse to break and tear, rend and destroy, *anything* that comes to hand. This has been noticed among gregarious animals—*e.g.*, if a herd of cattle are enraged by the sight of a companion in distress, they are as likely as not to vent their rage on the unfortunate victim himself, if nothing else catches their attention. In the same way, when one of a group of dogs utters a howl or cry for no apparent cause, the others, angry at his distress, have been known to turn and attack each other when there is nothing else to attack.

At higher stages of mental life, the opposition which is the real object of the emotion may take more complicated forms; and the development of ideation enables the characteristic activities of Anger to be concentrated on its actual existing cause. Professor G. F. Stout has excellently stated the various forms of this emotion in their relation to mental development:[1] "Anger initially expresses and satisfies itself by a peculiar form of violent motor discharge. Even at the outset it takes the form of an effort to overcome resistance by main force. The young child who has acquired no definite mode of wreaking its passion, shows it by vague kicking and struggling, by movements which antagonise each other and encounter resistance in external objects. The development of cognitive consciousness serves simply to restrict this diffused mobility within more definite channels. The child in a later stage throws his plaything violently to the ground, or pushes it away, or breaks it, or, in the case of a person who thwarts his will, he kicks, pushes, or strikes. Even the adult may find some satisfaction for his irritation in destroying furniture, and he nearly always has a strong disposition to break, tear, or rend something. Inasmuch as his anger has become enlightened and defined, his destructive impulse will become more specially directed against the object by which his desires are crossed or thwarted. But when the conditions deny him this satisfaction, it is well known that the angry man is very apt to wreak his anger on inoffensive things or persons, thus approximating to the condition of the child. Though the tendency to overcome resistance by violent exertion of bodily force seems always to play some part in anger, yet with the advance of intellectual development it gives place more and more to an ideal satisfaction; it becomes enough to know, or sometimes even to imagine, that the opposing forces have been crushed by our agency. This is, of course, a direct consequence of the growing importance of the life of ideas as compared with that of perception. But even in the ideal satisfaction of anger, the impulse to destroy or break down opposition may be satisfied to some extent by wreaking it on other objects than those which immediately awaken resentment."

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[1] *Analytic Psychology*, bk. ii., ch. vii., § 2 (vol. ii. p. 96).

In addition to the aggressive movements in the expression of Anger, the muscles of the eyebrows and jaws are set in a way which seems an "organic reminiscence" of the utility (in past ages) of clear vision with protection of the eyes, and of biting. In affective quality it is a massive excitement, predominantly painful. Its general organic symptoms are the opposite of those of Fear; in particular, it is accompanied by vasomotor flushing and excitement of the circulation.

When the emotional impulse of Anger, aroused by the infliction of some ill, is (so to speak) deliberately taken in hand by the agent, and made into a calculating determination to return ill for ill, we have *Revenge*. In animals it is indistinguishable from the immediate impulse of Anger. In primitive societies it becomes the rule and custom of "an eye for an eye, a tooth for a tooth, a life for a life."

The *emotional disposition* resulting from Anger is *Hate*. Its feeling-tone and bodily symptoms are the same as those of Anger. Anger seems to lead to Hate when the aggressive movements, expressive of Anger, are more or less permanently restrained. Hate is not simply the cherishing of Anger; or rather, the Anger is only cherished because not satisfied.

Bain's account of Anger (*Mental and Moral Science*, pp. 261-263) seems defective in more than one respect. "Anger contains an impulse knowingly to inflict suffering upon another sentient being, and a positive gratification in the fact of suffering inflicted" (p. 261). This involves the development of distinct ideas; it is too narrow as not covering primitive forms of the emotion, where no such distinct ideas are possible; and it does not cover the higher forms of what Bain admits to exist—*i.e.*, "righteous indignation," when anger mingles with the moral feelings (p. 266). Moreover, there is little doubt that it is altogether a mistake to make a "positive *pleasure of malevolence*" an essential part of Anger. The "pleasure of malevolence" is the delight in inflicting pain and injury on another being simply because it is pain and injury, and for no other reason whatever,—"disinterested malevolence." Granting that such an impulse exists (see discussion between Bain and Bradley, *Mind* (O.S.), vol. viii. pp. 415, 562), it is quite possible that Anger is at times complicated with it; but the two impulses are characteristically distinct. It is a matter of common experience that Anger may be vented on inanimate objects, known to be inanimate.

§ 10. *Love.*—The emotion known in common language as *love* is a sentiment—in the technical sense of the word—which manifests itself in particular emotions and actions. As the term is usually understood, it includes sympathy; love and sympathy are regarded, not as the same, but as so united that without "sympathy" most of the characteristic developments of "love" could never arise. Love unaided by sympathy is described as "selfish love"; and its essential mark is to seek to satisfy itself, *regardless of the welfare of the loved object.* When the feeling is excited, not merely by the presence of the loved object (another sentient being), but also by considerations for the welfare of the object, we have the emotion or sentiment of love.

If we try to separate the two ingredients and consider them apart, we may perhaps distinguish them as Mr Sully has done: "In the first place, there is the liking for others growing out of the pleasure or satisfaction which the presence or companionship of others brings, or the bare *feeling of attachment*, an emotion that has in its more concentrated forms the characteristic reaction of fondness or caressing. In the second place, there is the feeling of sympathy, or the sharing or entering into the feelings of others. The former ingredient has an egoistic basis. . . . The second ingredient is the pure altruistic element in the feeling."[1]

What is here called the "feeling of attachment" is also called by Bain the "tender emotion." This phrase is very vague, and should not be used. Some writers have adopted it (apparently) to stand for the pure altruistic element both in love and sympathy; they regard sympathy as not necessarily altruistic, and as needing the aid of the so-called "tender emotion" to become so. See Ribot, *op. cit.*, pt. ii., ch. iv. (pp. 230ff), and Shand in Stout's *Groundwork of Psychology*, ch. xvi. This involves an arbitrary limitation of the meaning of sympathy (to some of its incomplete and undeveloped forms) and a confusing departure from the usages of ordinary speech. The term "tender emotion," so far as it has any definite meaning in common language, seems to stand for *compassionate* feeling—one of the characteristic developments of sympathy. We do not require the term in psychology.

The account given in this book does not differ materially from that given by Sully* (vol. ii., ch. xv., §§ 11-14, 15-23) and Bain, chapters on "The Tender Emotions" and "Sympathy and Imitation" in *The Emotions and the Will* and in *Mental and Moral Science*, except that the account given by Bain seems to need to be supplemented in one important respect, and that the same writer greatly exaggerates one element in the bodily expression of the feeling of attachment.

At the level of animal life the feeling of attachment springs from certain primary feelings arising from physiological facts: the feeling of maternal satisfaction in tending offspring and the gratification of the sexual impulse. These are complicated by "transferred feelings" (§ 6) leading to a general satisfaction in the presence of the sentient beings who have given pleasure. But until the life of ideas (memory and imagination) has attained to a considerable degree of development, the feeling can only exist in limited forms.

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[1] *The Human Mind*, vol. ii., chap. xv., § 12.

At the level of mental growth characteristic of human life the feeling may be described in general terms as an exclusive interest in a particular person—an interest of such a kind that no other than the particular person loved can satisfy it; but the "exclusiveness" has degrees, and not all kinds of love are limited in reference to one individual. Bain appears to have regarded the whole physical expression of the feeling of attachment as consisting in bodily contact of some kind—touches, caresses, embraces, &c. There is little doubt that this is a great exaggeration. We can only say that the natural outlet of this feeling, in all its forms, is delight *in the society of*, *or in the presence of*, the individual who is its object. The same writer speaks quite truly of its connection with tranquillity and repose: "It is a tranquilliser under morbid excitement, a soothing power in pain, a means of enjoyment when the forces of the system are at the lowest ebb or in abeyance for the time." [1]

We may distinguish forms of the feeling of attachment, among human beings, according to certain relations among individuals; thus:—

(*a*) Attachment based on inherited dispositions through blood-relationship. These forms of the sentiment are sometimes called "the natural affections." Their strongest and most typical expression is in parental love. This is the least exclusively *human* form of attachment; as we have seen in other cases, there is in human affection a primitive groundwork modified and enriched by the self-conscious and rational nature of man. The conditions of parental love have been thus stated by Martineau: "That the beings on whom it is directed be, independently of us, the *image of our essence*, and, dependently upon us, the *continuation of our existence*." "Suppose either of these elements of the case absent; suppose the child to be human, but not ours; or to be ours indeed, but to turn out other than human; and the feeling in the one instance fades into general kindliness towards the young, and in the other shrinks away and passes into repugnance or terror."

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[1] *Mental and Moral Science*, p. 242.

(*b*) Love as independent of blood-relationship. This form of the sentiment is really *Friendship*, more or less exclusive, more or less intense. Friendship seems naturally to rest on a contrast, not of hostile qualities, but of *supplementary* ones; so that it is not a case of one liking what the other hates, but of an instinctive feeling that one supplies the deficiencies of the other.

(*c*) Love as between persons of opposite sexes,—"romantic love." Here the "exclusiveness" of the sentiment is most prominent. This, as it occurs in civilised society, is a highly complex emotional disposition. Part of its impulsive character arises from its connection with the mating instinct, and part of the pleasure involved in it is of the sensuous-æsthetic kind—through the senses of sight and touch; and Bain's remark that the tender emotion culminates in an embrace is less inapplicable.

§ 11. *Sympathy.*—Sympathy is an emotional disposition resting on the interpretation of other beings by ourselves. Seeing the signs of a certain experience in another, or merely thinking of him as having that experience, we tend to feel an emotion qualitatively the same as that which we believe him to have from the experience. We are able to interpret the signs of another's feeling, if his emotion is one which we have felt ourselves, or even if it is one which we *have never ourselves felt*, provided it is one which we are humanly *capable of feeling*. This is of extreme importance, for otherwise our ability to appreciate the feelings of others would be strictly limited to the range of our own experience. Persons who are thus limited in their sympathies are regarded by common-sense as lacking in sympathy or "imagination," as "narrow-minded," or as "undeveloped characters." It is the reach of sympathy beyond this limit that makes it so great a factor in widening our knowledge of ourselves and our outlook on life. We alluded to this in speaking of Introspection (ch. i., § 4, pp. 12, 13); this was only one particular application of a general principle. The presence of others is a means of discovering the individual to himself, because *their* experiences are *actually or potentially his*, and he knows it. In the case of sympathy, we may avail ourselves of Bain's definition: to sympathise is "to enter into the feelings of another being, and to act out these for behoof of that other as if they were our own."[1] Anything short of this is an incomplete or undeveloped form of sympathy.

Bain's careful account of Sympathy (see chapters under this title in *Mental and Moral Science* and in *The Emotions and the Will*) is defective in not recognising the importance of the fact that we can sympathise beyond our experience. Mr Sully's excellent treatment (*Human Mind*,* vol. ii., ch. xv., §§ 15-23) recognises this incidentally (§§ 18, 23). The problems in the psychology of sympathy are well summarised by Höffding, *Outlines*, pp. 244ff.

The immense practical importance of sympathy lies n its characteristic prompting—*to act for another person exactly as for self.* This appears perhaps most clearly in the form of sympathy known as *compassion*—the feeling which springs forth at the sight of suffering, and which leads directly to efforts for the relief of the sufferer.

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[1] *The Emotions and the Will*, ch. vi.

The process of sympathy affords an indication of the fact which we arrived at above through criticism of Professor James' theory,—that the bodily symptoms of an emotion are, to a limited extent, part of the cause of the emotion. We do not, it is true, actually imitate or go through the manifestations of the emotion that we see in another; but so far as we apprehend them at all, we go through them in idea, and the mental representation of them is accompanied by nervous discharges which to a certain extent make us feel them. This helps or contributes to arouse the corresponding emotion in us. But this instinctive reaction is of course not the sympathetic feeling itself. The latter depends on the imaginative interpretation of the emotional signs which we perceive. If the feeling which is expressed is very familiar, as when a mother hears her child cry, the interpretation is instantaneous. It is less immediate, according as the feeling which is expressed is less familiar to our past experience. In the case of new untried experiences it may be a matter of difficulty; and though it is certain that we *can* sympathise beyond our experience, cases may arise which are altogether outside the range of our sympathies, as with the average Englishman and the Irish peasant of the south and west. Finally, in all complete sympathy there is the active impulse referred to in the preceding paragraph. Hence for complete sympathy there is needed a considerable development of the capacity for forming free ideas of imagination, and of a common emotional life among the members of a community. The highly organised social life of a modern civilised country, with its closer and more systematic co-operation, affords ever new openings for effective sympathy, extending, unfortunately, far beyond the power of sympathy which the average man possesses.

We must be quite clear as to what is implied in this imaginative realisation of the emotion of another. It is by no means simply that one echoes (as it were) the organic sensations or pleasures or pains of the other. The emotion itself, which is to be sympathised with, is a concrete and total state of mind, including, as we know, not only affective qualities and internal sensations, but perceptions or ideas and active tendencies as well; it springs out of a definite intelligible situation; and it has effects on the individual's character and desires. All these things are realised, in some degree, in the imagination and feeling of the true sympathiser. Thus true sympathy may be called *disinterested* or *rational* sympathy.

Hitherto we have spoken of sympathy only in its highest forms; and we have incidentally referred to its "incomplete" and "undeveloped" forms. We now briefly indicate the nature of these. Their general character is to be more allied to *instinctive imitation of the emotional manifestations* witnessed in another being, than to *imaginative realisation of the emotion* which is expressed. Hence they have been called cases of the "contagion of feeling"—a phenomenon frequently illustrated in the animal world (especially among gregarious animals); among the lower races of mankind; and in children.

The animal that merely utters cries in response to the similar cry of his fellow, takes on, at any rate, one factor in the emotional state which the other's cry expresses; but the imitative sympathy does not fully operate until the sounds or other signs, which the one creature perceives, actually suggest and arouse in him the other's feeling. This may occur without the animal having any *idea* or mental representation of his fellow-creature as a distinct being who feels in such a way.

Some of the facts, illustrating what we have just said, are familiar. For example, there is the contagion of *fear*, which has been so often noticed among gregarious animals, as in a flock of sheep;[1] also among children, and the lower races. A "panic" in a crowd, or in an army, occurs in the same way; for in a sense it is true that the crowd has a *mind of its own*, and this mind is at a lower stage of development than the minds of the individuals composing the crowd. "Mob passions" are proverbially savage.

The kind of sympathy of which we speak is illustrated, at the level of civilised human life, in such facts as feeling depressed at witnessing the signs of grief, pained at witnessing suffering, inclined to laugh at others' laughter. Such experiences are by no means necessarily altruistic. A man may feel this so-called sympathetic pain at the sight of suffering, and it may prompt him to go away and dismiss the scene from his mind, so as not to be troubled by it.

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[1] The following is a curious case of the combination of such contagion with what looks like heredity: a flock of geese, having been kept and bred together for successive generations, "every evening for ten years manifested wild terror at a place and twilight hour coincident with a murderous attack that had once been made on them by dogs, although all the older members of the flock had been killed off every year for market."—(*Revue Scientifique*, 4th May 1889; quoted in Schofield's *Unconscious Mind*, p. 14.)

The higher form of sympathy—involving a distinct mental representation of our fellow-creature's feeling *as his*, and an impulse to act for his sake—can and does occur sporadically in the animal world (in maternal care for offspring) and in the lower races; but for the reasons already given, its fuller and more varied forms can only occur in civilised communities.

§ 12. *Sympathy and reverence as fundamental moral impulses.*—The higher development of sympathy prepares the way for yet another stage, in which sympathy may be regarded as a fundamental moral impulse.

The general aim of this sentiment may be thus described: it prompts us to act *so that another person shall be or attain to something which we regard as better than his present state.* This covers, in the first place, compassion (the relief of suffering); it covers the spread of instruction and enlightenment; it covers uplifting of *character*, and the removal of all influences tending to depress and hinder the development of human nature. The "something better" which is desired, is judged to be better because, finding it actually realised in ourselves or others, we compare it, as so realised, with the state of the person, or class of persons, to whom our desire has reference.

There is a *converse* form of this desire, based on the recognition of our own state as unworthy when compared with that of another personality,—*realised* in him, and *potentially* ours. "It is the objective image of the nature sleeping within us," says Martineau, "that wakes it up and startles it into self-knowledge. The living exhibition in another of higher affections than we have known, far from remaining unintelligible to us, is the grand means of spiritual culture. The natural language of every passion of which we are susceptible speaks to us with a marvellous magic, and calls up fresh islands and provinces of consciousness where there was a blank before. And whoever is the first to give explicit manifestation to our own implicit tendency touches us with admiration and acquires a certain power over us." It is at this stage that Reverence comes into being—if it does at all. This is a sentiment attaching intimately to personality. It is, however, to be distinguished from Respect or Admiration; these are sentiments resting on the recognition of what is excellent, or even normally good in a person, understanding "good" and "excellent" in their widest sense. Reverence rests on the recognition of *moral superiority* in personal character. There are persons whose mental constitution is devoid even of the faintest beginnings of Reverence.

§ 13. *The moral sentiment.*—Sympathy—understood as the capacity to represent to oneself the inner life and feelings of others,—and Reverence—understood as the recognition of moral superiority realised in a personal life,—form the strictly ethical constituents of the complex fact called *Conscience.*

Conscience is intellectual, emotional, and impulsive in one. We are speaking of conscience as a psychological fact,—as what it is; not of what, from the point of view of ethical theory, it ought to be. In its intellectual aspect, it passes judgment as to whether a particular act is "right," or "ought to be done," in a particular situation. We have certain definite and wholly concrete facts,—the given capacity of the person at the given moment, and his given surroundings. Part of these surroundings consists of the concrete feelings and volitions of other persons in the given case. The moral act is that which meets the present actual situation; and what conscience judges of is the harmony (or the reverse) between the agent's own will and these given circumstances in which other personal wills play the largest part. This harmony is expressed in the judgment "it is right." The *data* on which the moral judgment is based—so far as they are purely ethical data—are provided by *rational sympathy*, affording insight into the life and feelings of the other persons to be affected by this act, and *reverence*, affording a recognition of the moral superiority of the act when compared with other possible ways of meeting the same situation. These facts in the concrete experience are expressed in the judgment "it ought to be done," which implies an authoritative claim, which we call "moral obligation."

It is usually said that the most distinctive characteristic of the ethical feeling is its *sociality*. "Our duties *are* our social relations." This is directly involved in what we have set forth. The action, which is morally judged, has reference to others, as we have seen, and this reference to the real interests of others is the basis of the moral judgment. We may extend this thought farther by introducing the idea of a *community*—a society that has settled down into definite and more or less orderly forms of life; and we may then say that "what is 'right' has no meaning save with reference to a community that would benefit by the line of action." It may be an ideal community,—a "kingdom of heaven on earth"; but the moral sentiment is always expressed in the consciousness of our relation to a community. On the other hand, this is not to be regarded as an exhaustive statement of its meaning; "the consciousness of our relation to a community" is not, by itself, an adequate account of the two roots of the ethical sentiment — reverence and rational sympathy. *Rational Sympathy* provides us with the idea of a *common* good, and *Reverence* leads us to value it as superior to merely private good.

From the point of view explained in the foregoing paragraph, we may work out a theory of the forms of duty as corresponding to the different forms of civilised social life. The outlines of such a theory are well stated in Muirhead's *Elements of Ethics*. See also Mellone, *Philosophical Criticism and Construction*, ch. vi. ("The Method of Ethics") and Appendix to chapter: here some of the qualifications necessary in the theory are pointed out.

Conscience, however, seldom or never judges on these purely ethical data *alone*. As a mental tendency or disposition, conscience is mingled inextricably with inherited and acquired experiences which we may call non-ethical (the use of this term implies only that in our view these other factors do not contribute the characteristically *moral* element in conscience). The other factors may be classed under three heads.

(*a*) Experience of the results of actions with respect to the agent's own pleasure and pain. By the "law of transference" (§ 6, *a*) the mere idea of an action may acquire affective quality strong enough (according as the past results of the act have been pleasant or unpleasant) to be the basis of a habit of preference or avoidance.

(*b*) Experience of the force of public opinion or the collective opinion of party or class: this again leads, by transference of feeling, to the formation of habits of preference or avoidance (aided by love of approbation and regard for others' opinion). In this way the *social* results of his actions, as beneficial or injurious to the community, are impressed on the agent.

(*c*) The same result ensues from what Bain calls "our education under Government or Authority," by which certain acts are from the beginning associated with disapprobation and punishment.[1]

It is implied in all this, of course, that the individual has some regard for his own happiness and welfare; otherwise these experiences could never have the results which they do have. Hence it seems unnecessary to mention "self-interest" or "prudence" as a factor specially contributing to the formation of conscience.

Hence what is ordinarily called conscience is a highly complex fact. The result of this complication is that these non-ethical data may *displace* the purely ethical data as grounds of judgment. But in the ordinary deliverances of conscience the two kinds of data are combined. Hence arise (*a*) the admitted variations in moral judgment in different communities or different times, and (*b*) a general agreement as to the moral value of certain general rules of action (as for instance in the ethical portion of the Decalogue). When a community has developed the capacity of disinterested sympathy, and of appreciating the results of actions on the common welfare, a system of customary rules of conduct (for the common welfare) begins to take shape. We must add that in this regard for the *common good* as more worthy, or as having higher claims than momentary or individual inclinations and passions, the action of the purely ethical sentiment of *reverence* is to be found.

It is now generally admitted that no account of the development of conscience can be given which does not presuppose disinterested sympathy, under one name or another; see Sully, *Human Mind*,* vol. ii., ch. xvi., §§ 17-23; Ribot, *Psychology of the Emotions*, pt. ii., ch. viii.; Höffding, *Outlines*, pp. 258-261. On the other hand, the sentiment of reverence, and its effects, are generally ignored in this connection. But as a matter of fact and experience, reverence is as characteristic a sentiment as sympathy, and there seems to be no reason for denying its operation in the development of morality. We may go farther, and say that this sentiment alone can account for the *moral valuation* even of the common good as superior to the personal and limited good. Höffding says: "When *sympathy* leads to such a *valuation*, it becomes an ethical feeling . . . [implying] the idea of a connected whole of conscious beings, each of whom has his own special centre of life, and each of whom consequently has a claim to a special form and direction of sympathy. The view being thus enlarged, the individual feels himself only a single member of a great kingdom evolved in the course of ages; and that to which the impulse of self-preservation and the impulse of momentary sympathy alike impel him is ultimately controlled by the impulse to work for the advancement of this kingdom. When this impulse comes into more or less strong opposition to the egoistic or the narrower sympathetic feeling, it is felt, if it still succeeds in taking effect, as a law which requires the individual and limited to be subordinated to the universal and comprehensive. The ethical feeling resulting from this is the *feeling of duty*" (pp. 259, 260). This admirably pointed statement brings out the contrast which makes the moral life possible; and this feeling for the higher claim of the universal and comprehensive is, we submit, an essential constituent of human nature. We have called it Reverence. Disinterested sympathy alone will not provide it. Writers who deal with the development of morality usually assume that it is explained by the operation of the factors which we described above as "non-ethical"; but we affirm with confidence that these, by themselves, could make us feel the common good as superior in *size* or in *power*, not as superior in *moral worth*. This distinctively ethical characteristic is just what they will not explain.

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[1] See Bain, *Mental and Moral Science*, part ii. (Theory of Ethics), ch. iii., §§ 9, 10, 11.

There are certain instinctive emotions of the type of group i. (see § 5, above) which we have not referred to:

these are *joy*, *grief*, *shame*, *pride*. Connected with the last two are the "emotions of self" in their various forms: self-complacency and self-esteem, self-despondency, love of approbation. The student should attempt an analysis of some of these according to the scheme given in § 8, and compare the results with what is said under the respective titles in Bain's *Mental and Moral Science.*

The two remaining types of group iii. (ideal sentiments) will be most conveniently treated in connection with the subject of our following chapter.

We add some general references for the topics dealt with in this chapter. Brief but suggestive accounts of the various emotions and sentiments will be found under the respective headings in Baldwin's *Dictionary.* On the instinctive emotions of groups i. and ii., see Sully,* *The Human Mind*, vol. ii., ch. xv.; James, *Principles of Psychology*, vol. ii., ch. xxiv., xxv.; Ribot, *Psychology of the Emotions;* Bain, *The Emotions and the Will* and *Mental and Moral Science.* With regard to group ii., see in particular Bain's chapter on "Ideal Emotion" (also in his *Mental and Moral Science*). On the ideal sentiments (group iii.), see Sully,* ch. xvi.; Höffding, *Outlines*, ch. vi., §§ 8, 9; Ribot, as above; Bain, as above; and for an elaborate attempt to show the course of development, Spencer, *Principles of Psychology*, vol. ii., part ii., ch. vii. and following. Bain's treatment is still of great value; certain defects in it have been pointed out above. Mr Sully's references will guide the reader who is able to consult French and German works.

The psychology of religious feeling is touched upon in most of the above works; but it is really a separate branch of the subject, lying outside the limits of this book.

CHAPTER X

THE GENERAL CONDITIONS OF PLEASURE AND PAIN.

§ 1. *Meaning of problem.*—The contrast between pleasurable and painful feeling is — broadly speaking — so marked that we are naturally led to inquire whether there is any corresponding contrast in the attendant circumstances of these two kinds of feeling. Is there any characteristic condition always present when pleasant feeling arises and absent when painful feeling arises; and any contrasted characteristic condition always present when painful feeling arises, and absent when pleasant feeling arises?

Most psychologists say *yes*. There are various theories on the subject, which may be grouped as follows:—

(*a*) Psychological theories, which seek to assign a general law for pleasure and pain, in terms of consciousness alone.

(*b*) Genetic or biological theories, which attempt to show the origin and evolutionary significance of pleasure and pain and the corresponding internal states.

(*c*) Psycho-physical theories, which attempt to state a general law for pleasure and pain in terms of the action of the central nervous system.

Usually the attempt is made, by upholders of one or other of these theories, to make it cover the whole field of the affective life,—to prove its applicability to every level of mental growth. This does not seem to be possible with any theory at present in the field.

§ 2. *Pleasure-pain and activity.*—One of the fundamental principles in the psychological position worked out in this book is, that the mind is essentially active in being conscious of an object (of any kind).[1] Conscious life is never without activity, occupation, exercise: "conscious energy is conscious life"; this is true throughout, even at the low levels where there is no consciousness of end or purpose.[2] Above these levels, any conscious activity is a tendency towards some end of which we are conscious,—"some positive result ideally represented before its achievement." On the achievement of the result, this particular conation completes itself and has nothing further to accomplish; as a distinct conative process, it ceases. It has been well said that "if a conative process is allowed to develop freely without interruption or repression, it tends to go on until a certain result is attained, and when the result is attained it ceases of itself." This result is a mental state, and may be called the *end-state;* it accompanies but is not the same as the achievement of the *end* or consciously represented purpose of the conation.[3]

It is in immediate connection with these conscious tendencies that pleasure or pain arises. No pleasure or pain arises except as accompanying some active tendency.

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[1] Ch. iv., § 3; ch. vii., § 10.

[2] Ch. vii., §§ 1, 3.

[3] This distinction between *end* and *end-state* is also made by Professors Stout and Baldwin in Baldwin's *Dictionary*, vol. i. p. 323, article "End (in Psychology)." The distinction is between "(1) the form in which the end appears to the striving subject before its attainment, and (2) the psychical state which arises when it is completely attained." The authors observe that the latter (the end-state) consists "not in pleasure or relief but in satiety." On the contrary, it seems to us that the end-state may certainly take the form of relief.

Can we, then, arrive at any general statement of the connection between pleasure or pain and conation?

(i) The most obvious answer to this question lies in the fact, implied in the expressions (regarding feeling) current in common language, and referred to above (ch. iv., p. 68), that activity is "feeling-prompted." Some change takes place in our surroundings, we are pleased or pained by the change, and we act accordingly. The general fact is very well put in a passage from one of the earlier modern writers on psychology quoted by Hamilton.[1] "A person is fond of cards. In a company where he sees a game in progress, there arises a desire to join in it. Now the desire is here manifestly kindled by the pleasure which the person had and has in the play. The feeling thus connects the cognition of the play with the desire to join in it; it forms the bridge and contains the motive by which we are roused from mere *knowledge to conation*, by reference to which we move ourselves so as to attain the end in view. Thus we find, in actual life, feeling intermediate between cognition and conation. . . . Without some kind or another of feeling towards an object, there could be no tendency of the mind to attain this object as an end; and we could therefore determine ourselves to no overt action. The mere cognition leaves us cold and unexcited; the awakened feeling infuses warmth and life into us and our action; it supplies action with an interest, and, without an interest, there is for us no voluntary action possible. Without the intervention of feeling, the cognition stands divorced from the conation, and apart from feeling, all conscious endeavour after anything would be altogether incomprehensible." Hence —as it has been otherwise expressed—"the dynamic efficacy of ideas is entirely excited through the feeling subject; . . . it is the subject who acts upon his appreciation of the stimulus, and the emotional attitude of welcome or repulse is what is meant by feeling."[1]

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[1] Biunde, *Versuch d. empirischen Psychologie* (1831); quoted by Hamilton, *Lects. on Metaphysics*, vol. ii. pp. 425-427.

There seems thus to be a relation of dependence at least in this way—that *if activity is to take place, feeling must be there.* In this sense, activity depends on feeling.

(ii) This suggests the question, Is the dependence mutual—*i.e.*, does the feeling depend on the activity? This question, as we said above, must take the form: Is there any broad dividing line possible, in the character of active mental occupation with objects, corresponding to the broad dividing line between pleasant and unpleasant qualities of feeling? Can we say that when pleasure arises, it is the concomitant of mental activity of a certain kind, and when pain arises, it is the concomitant of mental activity of another kind? The answer which is proposed is as follows. The more easily an active tendency passes to its *end-state*, the more pleasant it is; the more an active tendency is obstructed (the more it is repressed, or carried on under difficulties; or deprived of sufficient exercise, as in cases of "monotony"), the more unpleasant it is. The same thing may be otherwise expressed when we regard a conative tendency as the progressive achievement of an *end:* the end in view is never absolutely simple—it has different aspects or elements;

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[1] See essay on "The 'New' Psychology and Automatism," in Professor A. S. Pringle-Pattison's volume, *Man's Place in the Cosmos*, 2nd ed., p. 73.

and when these further one another, play the same game, so to speak, and so facilitate conation, we have pleasure; when the contrary, conation is thwarted, and we have pain.[1] A good illustration has been given by Professor Stout. "The type of the painful state is *Tantalus*, continually reaching after the fruit which continually evaded him. All pain consists in being somehow *tantalised*,—in having a mental tendency at once stimulated and obstructed. The counterpart on the side of pleasure to the state of Tantalus is not, however, that of immediate and complete attainment; it is the smooth and prosperous progress towards attainment."[2] With final attainment of the end, this particular tendency ceases to operate, and the pleasure ceases also.

Thus the dependence of feeling and conation is mutual. Neither of them can vary in complete independence of the other; and neither of them is a mere dependent product of the other.

Referring to the connection of the positions laid down in paragraphs (i) and (ii) respectively (viz., on the one hand, that activity is feeling-prompted, and on the other hand, that the pleasant or unpleasant quality of the feeling depends on the nature of the activity), Professor Stout observes (*Manual*, bk. ii., ch. viii., § 5, p. 235): "If it is supposed that, first, pleasure exists, and that, subsequently to its occurrence, the conative tendency arises as a consequence, it is a logical circle to explain the pleasure by reference to the conation. But, as a matter of fact, there seems to be no reason whatever for supposing that feeling-tone and conation are separated in time. From the very beginning they appear to coincide; from the very beginning a pleasing process is a process which tends to maintain itself." This passage suggests the following remarks. (1) To conceive of activity as feeling-prompted does not require us to assume that the feeling and the activity are "separated in time"; it only requires us to assume that the activity is not identical with the feeling, and that *if* the activity is to arise, the feeling must be there. (2) To say, without qualification, that "they [feeling-tone and conation] appear to *coincide*," that (*e.g.*) "a pleasing process *is* a process which tends to maintain itself," is surely to identify the two. Or if not, it is so far to identify them that we cannot assert the dependence of pleasure-pain on conation in the sense in which Professor Stout himself asserts it (as in paragraph (ii) above); for if we are prevented from asserting the dependence of activity on feeling, because this implies priority in time, we are for a similar reason prevented from asserting the dependence of feeling on activity. (3) It is inadmissible even to speak of the possibility of "explaining" pleasure-pain by reference to conation (or the reverse). We must lay down as a primary and fundamental principle that conation, feeling, cognition, are of equal importance for the interpretation of consciousness; consciousness cannot be interpreted in terms of one of these unless the others are made of equal importance with that one. Hence not one of the three factors (feeling, for instance) can be regarded as merely derivative from another (conation, or cognition). Cf. Mellone, *Philosophical Criticism and Construction*, Preface, pp. ix-xii. Thus there can be no logical circle in holding both the positions (i) and (ii), for neither of them is an "explanation," and together they only assert the interdependence of two factors, which yet are not so completely dependent on each other as to enable us simply to infer from the variations of one of them what the variations of the other will be.

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[1] Even in the case of what appear to be passively pleasant sensations (cf. ch. vi., § 9, p. 138) this will hold good; for there is at least an unconscious tendency to continue such an experience until we have had enough of it.

[2] *Analytic Psychology*, vol. ii. p. 270.

If, on the other hand, when Professor Stout speaks of "explaining the pleasure by reference to the conation," he does not mean that his theory derives the pleasure from the conation or seeks to give the origin of the feeling, or that we have "explained" the pleasure by reference to the conation when we can say that all conations of a certain kind are attended by pleasure: then Professor Stout's position does not differ from the one taken up in this book.

§ 3. *Pleasure, pain, and desire.*—The position that "whatever conditions further and favour conation in the attainment of its end, yield pleasure, and whatever conditions obstruct conation in the attainment of its end, are sources of displeasure," is illustrated by the most familiar experiences of daily life. It may be verified in every case of *desire* (ch. vi., § 9).

Desire, as we have seen, involves the presence of an *unrealised idea*, the end or purpose, the object desired; desire leads to action for its realisation, involving the mental process of conation; when the object is achieved, this particular conation ceases. Applying our principle to desire, we may say that desire is pleasant in proportion as action for its realisation goes on without being hindered by anything extraneous to itself; and that desire is painful in proportion as action for the attainment of the desired end is obstructed.

We shall use as an illustration the following passage from Bain.[1] "The inmate of a small gloomy chamber conceives to himself the pleasure of light and of an expanded prospect; the unsatisfying ideal urges the appropriate action for gaining the reality; he gets up and walks out. Suppose now that the same ideal delight comes into the mind of a prisoner. Unable to fulfil the prompting, he remains under the solicitation of the motive; and his state is denominated craving, longing, desire. If all motive impulses could be at once followed up, desire would have no place; . . .

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[1] *Emotions and Will*, ch. viii.

there is a bar in the way of acting which leads to the state of *conflict*, and renders desire a more or less painful frame of mind." This use of the term *desire* is certainly too narrow, in limiting it to *frustrated desires ;* but, allowing for this, it illustrates our point: so far as there is a bar in the way of acting, desire is painful.

This is impressively illustrated in the case of a complex desire embracing various subordinate desires, as in the working out of a comprehensive plan. Suppose the prisoner conceives a plan of escape, involving collaboration with an accomplice outside, filing through bars, crossing walls, disguising himself, &c. The *ultimate* end, freedom, is the unrealised idea on which the whole series of activities depends; but, though this final purpose may only occasionally appear in full consciousness amid the series of subordinate desires, the feeling-tone of the whole is pleasant and satisfactory so far as these desires (1) are in themselves successful and (2) work together harmoniously to realise the ultimate end.

It is sometimes remarked that desires which are specially prominent or intense in consciousness are to some extent painful. This is only true so far as the prominence of the desire means that it is itself unsatisfied and has a disturbing influence on other conations. On the other hand, a keen desire for the attainment of an end in view, both in sport and in the business of life, is indispensable for real enjoyment of the labour required for attaining it—provided that the labour, though considerable, is gradually successful.

§ 4. *Feeling-tone of intellectual activities.*—It is in connection with the processes of the intellect, and with the experience of the "beautiful" and the "ugly," that the theory of feeling, outlined above, can be most easily and completely verified. No detailed reference was made to these types of feeling in our preceding chapter, since they are most conveniently discussed here. We take first the feelings attendant on the operations of the intellect, directed to the ascertainment of fact and truth,—in a word, knowledge.

Knowledge may be valued from more than one point of view. The mass of mankind value it chiefly, or entirely, on account of its *immediate* practical bearings. People want to *know* only because they have something definite which they want to *do;* the knowledge is a means to something else. This utilitarian view of knowledge has its rightful place, and it lies at the bottom of a great deal of the interest in discovery and invention which is so marked a characteristic of the present age. But other valuations of knowledge also have their rightful place. It is impossible to deny the existence of an intrinsic interest in seeking for a cleaner, clearer, more inclusive mental view of things,—a theoretic curiosity, a theoretic need, often described as a desire for knowledge "for its own sake."

This last phrase leads to much misunderstanding. Nobody supposes that the mere possession of "truth" as a passive state, the mere representation inside us of what is outside us, has some mystic value on its own account. What is valued is the active-emotional direction of the mind to one end—of *so thinking* that our thought may harmonise intellectually with the fundamental structure of things. There have been very many scientific discoveries—which *after discovery* have proved of immense benefit to human life all round, but were in this sense useless at the time of discovery—which would never have been made, if the desire to know were not a real part of our nature: the "desire to know" for the sake of nothing beyond the essential intellectual-emotional activities involved in the realisation of the knowledge. Scientific discoveries are all "useful"; but sometimes their usefulness for the service of life and conduct is not an immediate but a remote consequence:[1] they are "useful" *in the first place* because man is rational and therefore desires them: he seeks them, we repeat, for the sake of nothing beyond their active realisation by the seeker.

It is in connection with this instinctive tendency—the search for or desire for knowledge, as an active impulse—that the intellectual feeling, in the proper sense of the term, arises. It must be distinguished from "surprise" (at what previous custom makes unexpected) and from the more prolonged state called (in ordinary language) "wonder," which implies a more settled interest in something novel. There is no single word, in English,[2] which provides a satisfactory name for the theoretic impulse, as such; "curiosity" and "wonder" are both unsuitable. Martineau adopted the latter term. "That *Wonder* is the primitive intellectual impulse, whence all philosophy springs, is a maxim held in common by Plato and Aristotle; drily stated by the latter;[3] embodied by the former in the graceful saying that 'it is a happy genealogy which makes *Iris* the daughter of *Thaumas*'[4]—*i.e.*, which treats the messenger of the gods, the winged thought that passes to and fro between heaven and earth, and brings them into communion, as the child of Wonder."[5] The same writer quotes, from Professor Lewis Campbell's interesting life of the late James Clerk-Maxwell, one more out of the innumerable examples of this characteristic of the genuinely scientific mind: "Throughout his childhood his constant question was, 'What's *the go of that?* what does it do?' Nor was he content with a vague answer, but would reiterate, 'But what's the *particular* go of it?' . . . I distinctly remember his telling me, during his early manhood, that his first recollection was that of lying on the grass before his father's house, and looking at the sun, and *wondering*."

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[1] An impressive instance of this is seen in the whole field of investigation opened up by the discovery of radium and radio-active substances.

[2] German, *Wissbegier*.

[3] *Metaphysics*, bk. i., § 2.

[4] *Theætetus*, p. 155.

[5] *Types of Ethical Theory*, 2nd ed., vol. ii. p. 152.

It is sometimes said that the operations of the intellect are "cold and passionless," or at most attended by "quiet feeling." Very often the feeling is "quiet"; but just as often the carrying on of purely intellectual work—as in thinking out a problem—gives rise to a high degree of excitement, which is just the emotion spoken of above (§ 3, *ad finem*),—the emotion of energetic pursuit gradually successful against difficulties. When Sir Isaac Newton started a calculation to test his hypothesis as to the Law of Gravitation,[1] and after proceeding a little way with it, perceived that it was likely to end in verifying the hypothesis, he was utterly unable to carry on the calculation, from the overpowering excitement of its anticipated termination; and he requested a friend to finish it for him.

In children the desire to know takes the form of a wondering curiosity about all kinds of things. This curiosity has been accounted a human instinct (see above, ch. vii., § 3). Children's questions are of many kinds,—judged from the adult point of view, some are profound, others meaningless, some of practical importance, others senseless or having no relevance to the case (as when a little boy takes a picture of a railway-train to his father and asks "where the train is going to," and is grievously disappointed because he can get no answer). In after years custom blunts the freshness of the child's curiosity; the mind settles down to take certain things as a matter of course, and ceases to inquire concerning what is customary. And then *surprise* at something novel or unexpected happening, is an indispensable preliminary to the desire to know. That anything, by mere repetition, can cease to need explanation, is of course a pure illusion. "True," says Carlyle, "it is by this means we live, for man must work as well as wonder: and herein is custom so far a kind nurse, guiding him to his true benefit. But she is a fond foolish nurse, or rather we are false foolish nurselings, when in our resting and reflecting hours we prolong the same deception."[1] The desire to know, and the capacity to find satisfaction in knowing, in the harmony of our thought with reality, are ultimate facts, behind which we cannot go.

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[1] That any two bodies attract each other with a force varying inversely as the square of the distance between them.

The pains and pleasures of intellectual operations, whether these are directed to the end of knowledge "for its own sake" or for some practical purpose, can all be brought under the general theory which we have had in view (§ 2, ii). The pains of intellect are all cases of thwarted endeavour. The following are obvious and yet quite typical examples. We try to recollect something, under difficulties, or in vain. We fail to understand or follow a proof—as in arithmetic or mathematics—or we unsuccessfully attempt to solve a problem. We try to work out some speculative view which only ends in puzzles. We find ourselves being led to conflicting results. We are drawn in different directions at once ("distraction")—as when a general at a critical juncture in war is undecided as to his course; or when a person receives contradictory advice as to the treatment of an illness. An event which is so strange or novel as to be outside the circle of ordinary events and in conflict with ordinary experience gives rise to an emotion (see ch. ix., § 9) whose painful character partly arises from the impossibility of intellectually adjusting the new experience to the old. All these instances show that an intellectual process is attended with unpleasant feeling so far as it leads to distraction, conflict, or contradiction.

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[1] *Sartor Resartus*, bk. iii., ch. viii. ("Natural Supernaturalism").

The extent to which the mind is capable of feeling the pain of contradiction depends on the degree of its intellectual cultivation. We said that the mass of mankind value knowledge chiefly by its immediate practical bearings; and when these are interfered with by contradiction or inconsistency in the intellectual process, most people have a keen appreciation of the state of affairs. But when the mind is sufficiently cultivated to appreciate *all* the bearings of true knowledge (even those which are not immediate but remote,—and some of its greatest practical consequences may be remote), then the thinker begins to feel contradictions and difficulties to which the multitude are indifferent.

The pleasures of intellect arise from the reverse conditions to those above mentioned. They may be included under one general description. Intellectual pleasure, properly so called, arises from harmonising facts which were separate or discordant before,—harmonising them by finding in them resemblances such that we may embrace them all under one idea or statement: this means an increase in the number of facts that can be comprehended by one intellectual effort, and therefore an economy and facilitation of effort. This satisfaction is greatly added to by contrast, as a relief from a previous state of intellectual indecision or inconsistency.

The character of the intellectual feelings is well described, in outline, by Sully,* vol. ii., ch. xvii., §§ 2-8. For a fuller account see Bain, *Emotions and Will*, ch. xi.; James, *The Will to Believe*, pp. 63ff. An account of recent controversies as to the relation of Truth to Practice is given by Mellone, *Mind*, N.S., No. 56 (vol. xiv. pp. 508ff).

§ 5. *Feeling-tone of the æsthetic consciousness.*—The æsthetic emotions are those aroused by Beauty and its opposite, and by the Sublime and the Ludicrous.

Our account of these will be simplified if we re-state the theory of pleasure and pain which we have been illustrating. We stated it in terms of *tendency towards an end;* we now state it in terms of *attention*—in this, following Professor Ward.[1] "There is pleasure according as a maximum of attention is effectively exercised, and pain in proportion as such effective attention is frustrated by distractions, shocks, or incomplete and faulty adaptations,—or fails of exercise owing to the narrowness of the field of consciousness and the slowness and smallness of the changes."

We have already pointed out that attention is simply conation (mental activity) carried on under a certain condition—viz., to attain to a fuller presentation of the object without seeking to alter it into something else. To a certain extent, therefore, our "re-statement" of the theory has limited it, since the process of "tendency towards an end" is wider in meaning than that of "more fully apprehending an object."

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[1] Article "Psychology," p. 71.

Æsthetic feelings appear in their characteristic qualities in connection with the products of the Fine Arts. It is agreed on all hands that these feelings may be distinguished as follows:—

(i) They do not depend on any ulterior purpose—such as utility or knowledge—served by the object which arouses them. Satisfaction in Beauty is sought "for its own sake." This is not to say that the purpose of Beauty is pleasure alone; and as to the phrase "for its own sake," we may refer to what was said above (§ 4).

(ii) They have no disagreeable accompaniments (as sensual pleasures have).

(iii) Their enjoyment is not limited to one or a few persons, but can be shared by all who have the capacity for appreciation. This consideration is very important, and of itself goes far to fix the limits of what can be called Beauty. To begin with, it limits the objects of æsthetic enjoyment to the two higher senses, sight and hearing.

There are many kinds of experience which in themselves do not belong to art, but can be brought into art by being represented in idea; these include many of our muscular and bodily feelings. Bain has very well illustrated this, showing how the principle that the pleasures of art are such as can be collectively shared assists us in drawing the line. "A painter or a poet may depict a feast, and the picture may be viewed with pleasure. The disqualifying circumstances are not present in ideal delights. So wealth, power, dignity, affection, as seen or imagined in others, are not exclusive. In fact, mankind derive much real pleasure from sympathising with these objects. They constitute much of the interest of surrounding life and of the historical past; and they are freely adopted into the compositions of the artist. It may be objected here that to permit, without reserve, the ideal presentation of sensual delights, merely because of its being a diffused and not a monopolised pleasure, is to give to art an unbounded licence of grossness. The reply is, that the subjects of Fine Art are limited by considerations that are very various in different countries and times, and are hardly reducible to any rule. The portraying of sensible pleasures is objected to on moral and prudential grounds, as over-stimulating men to pursue the reality; but there is no fixed line universally agreed upon. It is evidently within the *spirit* of Fine Art, as implied by the conditions above given, to cultivate directly and indirectly the sources of pleasure that *all can share in*, that provoke sympathy instead of rivalry. Hence [scenes and] tales that inflame either the ambition or the sensuality of the human mind, in their consequences, inspire what are called the *baser* passions, properly definable as the passions implying rivalry and hostility because their objects are such as the few enjoy, to the exclusion of the many."[1]

There has been a controversy as to whether *simple sensations* of sight and sound can be considered to afford æsthetic pleasure. This is not a point of much importance; for no one would deny that the characteristic experience of the beautiful begins with the combination of sensations into some kind of whole. Hence an art-product has been said to involve always a *unity in variety*. We may express the same thing by saying that the different elements in the combination must form a *harmony*. "A variety of elements," says Professor Ward, "be they movements, forms, colours, or incidents, instead of conflicting, all unite to further each other, and form not merely a mass but a whole." How, then, is the whole or harmony constituted? The answer is, that an art-product affects us with the characteristic feeling for beauty when it is at once *a harmony of matter, form, and suggestion.* No exclusive stress can be laid on any one of these factors in contrast with the others; each of them contributes something essential to the complete experience of the beautiful.

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[1] *Mental and Moral Science*, p. 291.

(*a*) *Material conditions.*—These are always of the nature of perception, and have, therefore, a basis of sensation. Different arts—music, painting, sculpture, architecture—appeal to the two senses in different ways, and each has its own characteristic manner of weaving the sense-material into the artistic effect.

(*b*) *Formal conditions.*—These will be found to be such that, in cases of artistic pleasure, *attention* is facilitated, readily and economically accommodated; in the contrary cases, it is surprised or obstructed. The reader will be able to verify this in detail. We give a few illustrations of it in connection with the simpler æsthetic experiences. In a harmonious combination of musical notes, the coincidences in the vibratory periods of the sounding bodies are more frequent, the more perfect the concord: thus, in the octave (the most perfect concord) there is a coincidence at every other vibration, since the string sounding the higher note vibrates twice as fast as that sounding the lower note. The more numerous these coincidences, the easier it is for attention to apprehend the two notes as one sound. There are similar coincidences of the overtones (ch. xi., p. 294) in the case of the musical concords. In a harmonious combination of colours, each is a retinal "rest" from the other. When, again, we take into account the *intensities* of the sense-elements, we find attention facilitated by the regularity of rhythmic succession, and the gradual increase or decrease of sound; or correspondingly in the case of sight, by gradual variations of colour (as in the rose) and curved or symmetrical outlines.

These harmonies of form unquestionably contain an important part of the conditions of pleasure in beauty; but they cannot be made the *only* essential factor. The late Edmund Gurney, in his wonderfully suggestive book, *The Power of Sound*, has shown that the artistic effect of an object may vary out of all proportion to any variation of its formal characteristics. It is possible to have a melody of exquisite beauty, and another which is dull and commonplace, with no difference of form between them that can be compared to the difference in effect. The same may be said of the effect of a succession of notes sung by a voice like that of Jenny Lind or Patti and by an average singer. There are evidently variations and intensities of æsthetic feeling whose sources elude our analysis at present.

Attention is facilitated by another formal factor in artistic effect: the effect is pleasing according as it is obtained with little effort and by simple means. This is most easily illustrated in poetry and rhetoric. The charm of Tennyson, as compared with a good deal of Browning's writings, is *in part* accounted for by the simplicity of the means taken to secure the effect. Considerations of this kind led Herbert Spencer to lay down the general maxim that, in composition and rhetoric, "economy of the recipient's attention is the secret of effect."[1]

(*c*) *Associative suggestion.*—The more our knowledge and experience grow, the greater becomes the suggestiveness of the most ordinary sense-experiences. They may in themselves be of no moment, but what they remind us of lends them their significance and meaning. This is none the less true if the past experiences, which are thus suggested, appear only in the form of vague or subconscious ideas, tinged with feelings similar to those which they originally aroused. The pleasantness of the monotonous call of the cuckoo is due to its intimate association with all that spring-time means. The beauty of an old romantic ruin is constituted by the massive recall of a multitude of vague associations. The artist avails himself of such associations to the utmost. These effects of suggestion are not of equal importance in every branch of art: they count for most in sculpture and painting, and for more in an "outline drawing" than in a full painting. Thus, to take a very simple case, when an artist sketches a tree in full leaf, he never gives an exact representation even of the outline of each detail in the real object (to do so, were it possible, would ruin the whole effect); he arranges a multitude of little wavy lines so as to *suggest* a tree; and the better artist he is, the more obvious and natural the suggestion will seem. Here, the actual sense-material is slight, and is overlaid with elements contributed by suggestion. In "word-painting" the suggested factors count for still more. The sense-material consists only of words (assisted, in the case of poetry, by rhythmic and metrical forms); but the effect of the whole is produced by suggestion, arousing the mood of mind which the writer desires to awaken.

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[1] *Essays* (last ed.), vol. ii., ch. ix.

The subject dealt with in this section is treated somewhat more fully in Sully,* vol. ii., ch. xvi., §§ 9-16 (one of the best accounts, in moderate compass, in the English language). See also Bain, *Emotions and Will*, ch. xiv.; Spencer, *Principles of Psychology*, vol. ii., pt. ix., ch. ix. (last edition); Gurney, *The Power of Sound* (with special reference to music, but suggestive for the general psychology of æsthetic feeling). The reader of German should consult Fechner, *Vorschule der Aesthetik*, and Lehmann, *Hauptgesetze des menschlichen Gefühlslebens.*

§ 6. *Biological and psycho-physical theories.* — Both forms of the purely psychological theory of pleasure and pain meet with difficulties in the case of simple sensations. These theories are applicable to the pleasures and pains of the higher senses (sight and hearing) and to those of muscular exercise; but in the case of the lower senses and the internal sensations, these assumptions of furthered or impeded attention, or tendency towards an end, are inapplicable.

The most familiar form of the *evolutionary biological* theory is that of Spencer: pleasures are the incentives to acts which tend to support life, and pains deterrents from acts which tend to destroy life. This is regarded as the result of natural selection, since races of animals whose pleasures corresponded to life-destroying acts and pains to life-preserving acts would inevitably perish. A creature so organised would find pleasure and delight in what was deadly to itself. This is certainly true to some extent; but two observations are necessary. (*a*) The principle does not afford any *general law* applicable to all pleasures and pains; for to preserve the species in the struggle for existence, it is not necessary that *every* pleasure should coincide with benefit to the bodily life as a whole, and *every* pain with the opposite. (*b*) Even if it did afford a general law, it would have only a partial application to the human race; for men are more complex than the lower animals, the "unfit" (biologically) are not allowed to disappear, and the human environment is always changing and rendering impossible any permanent adaptation. Spencer himself points out the far-reaching divergence which exists between pleasures and acts beneficial to the bodily life; although he looks forward to a time when a perfect coincidence between the two will have been evolved.

Bain states a principle connecting feeling and organic life thus: "States of pleasure are concomitant with an increase, states of pain with a decrease, of some or all of the vital functions."[1] This statement is applicable on the whole in the region of internal sensation; but there are exceptions. Severe organic derangements—such as consumption—may be almost painless; and the pain of an organic sensation may be out of all proportion to the organic injury involved (as in the case of toothache). It is very difficult, however, to apply Bain's view at all to the special sensations. Why, for instance, should the odour of a rose or the notes of a nightingale be pleasant, and the odour of sulphuretted hydrogen or the voice of a corncrake be so much the reverse? There is no increase or abatement of vital functions corresponding to the difference. Finally, in the case of feelings aroused by perceived objects, by imaginations, by memories, by ideals, the merely biological theory becomes unworkable. The development of these mental processes never has been and cannot be explained merely as a succession of devices for securing the efficient performance of *physiological functions* in the proper sense of the term, in which it is restricted to processes known to form part of the life of the bodily organism. The same remark applies to Ribot's view that pleasures and pains are the symptoms in consciousness of the satisfaction and dissatisfaction of "organic needs," if by the latter term we mean "physiological needs"; for physiological "needs" are those, and only those, which are necessary to the maintenance of bodily life. But Ribot, like other writers who are fond of talking in physiological terms, really widens the meaning of "organic needs" to include the whole range of *conscious desires* in addition to bodily needs; so that his theory in effect joins on to the psychological one (§ 2, ii.).

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[1] *Mental and Moral Science*, p. 75.

The *psycho-physical* theories look for a physiological correlate of pleasure and pain in special states of the central nervous system. It cannot be said that any such theory has yet been found to cover the whole ground even for the affective tone of sensation. The most hopeful theories are those that refer to the processes of *waste and repair* in the nervous system, and consider pleasure to be accompanied on the physiological side by a maximum of stimulation (and consequent nerve-action) *together with* a minimum of fatigue (unrepaired waste or undestroyed toxic substances).

The psychological theory is set forth by Ward, art. "Psychology," pp. 68-71; and by Stout,* *Manual*, 2nd ed., pp. 229-240, 276-283, 563 ff.; also *Analytic Psychology*, vol. ii., last chapter. It is tenable only if connected with the fundamental principle that the mind is essentially active in relation to its environment. Psychologists who take an inadequate view of mental activity can give no general theory of feeling in psychological terms. Thus, Sully (vol. ii., ch. xviii., § 2) states that "the most obvious general differentiating circumstance in all conative phenomena is the presence of the psychical correlative of muscular action; our consciousness of activity is based on the common peculiarities of our muscular sensibility."[1] But he also states that all the higher and more specialised forms of volition involve *also* "a psychical antecedent in the way of consciousness of purpose or forecasting of end," *ib.* (§3), for which the most comprehensive name is Desire. This statement provides the foundation for a psychological theory of activity and its connection with feeling, but no such theory is given.

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[1] This is essentially the view criticised above, chap. vii., § 10.

For the biological theory of pleasure and pain see Spencer, *Principles of Psychology*, vol. i., § 124 (cf. *Data of Ethics*, ch. vi.); Grant Allen, *Physiological Æsthetics;* Schneider, *Freud u. Leid d. Menschengeschlechts.* The theory is reviewed by Ribot,* *Psychology of the Emotions*, pt. i., ch. vi., and criticised by Külpe, *Outlines*, § 41. The connection with "organic welfare" is carefully examined by Lehmann, pp. 146-151.

Various forms of the psycho-physical theory are discussed in Marshall, *Pain, Pleasure, and Æsthetics* (Marshall's own view is examined by Stout, *Manual*, bk. ii., ch. i., § 6); in Külpe, *Outlines*, § 41; in Lehmann, pp. 152-161, and Ribot, *loc. cit.*

CHAPTER XI.

THE SPECIAL SENSES.

We now enter on a consideration of the third fundamental function of mental life,—the cognitive function,—thought proper, knowledge, or *intellection*. The reader should refer back to ch. iv., §§ 5, 6, for we are now about to proceed from the position set forth in that passage.

We come in contact with our environment through our senses. The mental experiences which we have through our sensory nerves, when considered by themselves and in abstraction from other processes, are called *sensations*. The psychology of sensation is really a special branch of the subject. An adequate treatment of it would require a volume to itself, even if we dealt only with facts ascertained beyond doubt, and omitted controverted points. It must be distinctly understood that in this book we can dwell only on the facts to which it is indispensable that the student's attention should be directed in an elementary course of psychology.

§ 1. *Essential aspects of sensation.*—In popular language, a "sense" is a group of sensations separated from other groups by a very broad dividing line,—as "sight" is from "hearing," or "taste" from these and from "smell," &c. From the point of view of pure psychology, we could give no further account of the difference between these groups: physiology explains it as due to the fact that the respective groups come to us through different organs,—the "eye," the "ear." These differences of sense-organ give us differences of *quality* in the sensation.

Popular language recognises five such groups, but we have already seen that it is necessary to be more precise.

(1) We must first distinguish and set aside the class of so-called sensations having no special sense-organ, not arising from the periphery but from the interior of the organism. These are, of course, the internal or organic sensations, whose characteristics we have discussed in chapter viii. under the head of Feeling. They do not afford any means of information about outer objects, but only about the condition of the body itself, and that vaguely. To this class belong also those *muscular sensations* (especially muscular fatigue or injury) which form the basis of our acquaintance with the state of the muscle itself. The other groups are—

(2) Sensations of Taste proper. What is usually called "taste" is complicated with sensations of touch and smell.

(3) Sensations of Smell.

(4) Skin-sensations, usually confused together under the name of "touch." These are—

(*a*) Pressure, or touch proper;
(*b*) Temperature, so far as resulting from the application of heat or cold to the skin (and thus distinguished from *internal* sensations of temperature, ch. viii., § 2, vi.)

(5) All *muscular* sensations come to us not from without but through our own exertions; hence they have come under our notice in connection with mental

activity. They also afford important data for our knowledge of external things; in this aspect they will come under our notice in connection with space-perception.

(6) Sensations of Hearing.

(7) Sensations of Sight.

All these groups differ in *quality*. But besides these "generic" differences of quality we have also "specific" differences of quality within each group—*e.g.*, blue, red, green, in the case of colour. In addition to this, sensations differ in *intensity*—as in the contrast between a loud sound and a soft one; and in *duration*. These three aspects seem essential to sensation; for if any one of them vanishes or becomes "zero," the sensation vanishes. Thus, a sensation with *no intensity* is no sensation; and similarly with quality and duration.[1]

The groups numbered (2) to (5) in our list are described as "external sensations." They differ greatly in the extent to which they can afford data for knowledge of external things. Taste and smell are of least use in this respect; but they have been called "the servants of the body," because as a rule they inform us of organically injurious substances in the atmosphere or in food. Sight and hearing are of so much more importance than all the others, from the point of view of knowledge, that they have been distinguished as the "higher" or "intellectual" senses.

§ 2. *Sense of taste.*—The organ of the sense of taste is the mucous membrane covering the tongue (the back being the most sensitive) and the soft palate. At the back of the tongue, and extending also to its tip and edges, are minute protuberances (papillæ) in which are the nerve-endings for taste. These can be stimulated only by substances in solution; hence only soluble substances can be tasted. There appear to be four different *qualities* of taste,—"sweet," "bitter," "salt," "sour." Wundt adds two others, "metallic" and "alkaline"; but it is very doubtful whether these are really distinct qualities. Others reduce the number of such qualities to two, "sweet" and "bitter," on the assumption (extremely difficult to verify conclusively) that some of the qualities mentioned in the fourfold classification are compounds. It is quite true, however, that many of what we call tastes are not only compound but are compounded with sensations other than taste. (*a*) In some cases there is a mixture of organic sensations due to the continuity of the tongue with the alimentary canal. By this means tastes are complicated into what we call "relishes" or "disgusts." We may have the one without the other; thus, after sickness, we can discriminate "sweet," "bitter," &c., but nothing excites a relish. (*b*) In the case of a taste like alum, or fiery tastes like pepper or mustard, there is a mixture of true taste with muscular sensations; the stimulation is strong enough to cause reflex contractions of the muscles of the tongue. (*c*) The tongue is supplied with nerves for touch and temperature as well as taste, the tip being highly sensitive to touch. Hence when we take any solid or liquid food into the mouth we are able to feel its size, shape, smoothness, &c., and its temperature. It is certain that some of the sensations usually called tastes include the effects of touch. (*d*) Finally, tastes are complicated with smells, owing to the proximity of the organs. During a cold, when the nostrils and the passage to the throat are obstructed, we "lose some of our sense of taste,"—that is, we lose what the other sense contributes to the supposed "taste." It is said that in case of severe impairment of the sense of smell, it is not possible to distinguish the taste of a piece of apple in the mouth from that of a piece of onion, if the tongue is touched with the two in succession.

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[1] A fourth aspect of sensation is mentioned in many text-books, under the name of "extensive quality" or "extensity." We shall speak of this in connection with the psychology of space-perception.

Sensations of taste cannot be arranged in any kind of continuous series, like those of sound or colour; there are no gradual transitions from one taste-quality to another. They vary in what, for want of a better word, we have called "massiveness," according to the extent of surface acted on,—and in intensity, according to the degree of concentration of the solution of the sapid substance.

"Taste," says Professor M'Kendrick, "may be educated to a remarkable extent; and careful observation —along with the practice of avoiding all substances having a very pronounced taste, or having an irritating effect—enables tea-tasters and wine-tasters to detect slight differences of taste, more especially when combined with odour so as to produce flavour, which would be quite inappreciable to an ordinary palate." It is also well known that two tastes felt in succession may affect one another. A strong taste will affect another taken immediately after it; thus, sweetness will affect bitterness, and *vice versa*. This is a phenomenon of a type which we shall meet with again,—sense-contrast.

Further details and experimental proofs will be found in M'Kendrick's articles in the *Ency. Brit.*, "Taste," vol. xxiii. p. 79, and "Physiology," vol. xxxi. p. 746; also in Ladd, *Elements of Physiological Psychology*, pt. i., ch. v., §§ 6, 7; pt. ii., ch. iii., §§ 12-15, and ch. v., §§ 19, 20; where references to other authorities will also be found.

§ 3. *Sense of smell.*—The end-organs of the sense of smell are in the mucous membrane in the upper part of the nostrils. The stimulus sometimes consists of extremely minute particles given off by a body; most often it is a vapour or a gas. A stream of air must continually pass through the nostrils in order that the odour may be felt. Heat and moisture assist in spreading odours, because they help evaporation and decomposition. In the case of the odour of musk—taking this merely as an example—"the fineness of the particles is remarkable, for if the air conveying an odour be filtered through a tube packed with cotton-wool and inserted into the nose, a smell is still discernible." And such a filter would exclude particles even less than .00001 of an inch in diameter. What exactly these minute particles are is not yet known: it has been supposed that they may really be molecules in motion (molecular vibrations of a lower degree than those which give rise to sensations of heat). Professor M'Kendrick observes that a grain or two of musk will scent an apartment for years, and at the end of the time no appreciable loss of weight in the substance can be detected.

We classify odours only as agreeable and disagreeable. But in the case of the lower animals this sense is far stronger, and capable of a degree of fine discrimination which, perhaps, we cannot conceive; hence it is of the greatest cognitive value. Hence also the possibility of a great variety and extent of vivid impressions of smell, with their corresponding memory-traces, and the formation of strong emotional moods capable of being excited by such impressions.

If the stimulus is continuous, the sense is soon dulled, even in the case of powerful or highly unpleasant odours. This fact is capable of a mechanical explanation, "on the supposition that the olfactory membrane becomes quickly coated with a thin layer of matter, and that the most intense effect is produced when the odoriferous substances are applied to a clean surface."

Like those of taste, sensations of smell may be mingled with other sensations: sometimes with organic sensations, as in the "fresh smell" of pure air as contrasted with the "stuffy smell" of a store-house or a mill; or again with tactual sensations, as in the effect of smelling-salts or snuff.

On the sense of smell, see M'Kendrick, *Ency. Brit.*, vol. xxii. p. 167, and vol. xxxi. p. 745; Ladd, *op. cit.*, pt. i., ch. v., §§ 4, 5; pt. ii., ch. iii., §§ 8-11; and ch. v., § 21.

§ 4. *Sense of touch* (*cutaneous*).—The sense-organs of touch are spread over the whole surface of the body. Among the nerves connecting the outer surface with the brain there are some with free endings, the stimulation of which is believed to give rise to organic sensations; there are others with special endings having all the appearance of terminal sense-organs. The latter structures have a number of different forms; and it is certain that some of them are connected with the sense of touch proper, which thus has its own terminal organ just as truly as taste or smell. The organic skin-sensations, such as "tickling" or "tingling," have to be carefully distinguished from touch. Mr Sully illustrates the distinction thus: "In the experience of being *tickled* there is a certain element of true tactual sensation,—that of gentle contact, which is rapidly intermittent, and which commonly shifts from one point of the skin to adjacent points; but the whole effect with its large element of feeling involves the action of the nerves of common sensation as well."[1]

With regard to qualities of touch-sensation, ordinary language distinguishes "hard," "soft," "rough," "smooth." The first two, so far as they depend on touch alone, apart from muscular movement, are simply cases of greater or less intensity of pressure. The difference between "rough" and "smooth," again, so far as it depends on touch alone, is connected with "continuity or uniformity of pressure in the one case, and discontinuity or inequality in the other." In laying the hand upon a polished surface the pressure is uniform at all contact points, and the points are comparatively speaking continuous. A "rough" surface offers masses of irregular and discontinuous points.

The sense of touch can be experimentally tested in three ways:—

(*a*) "Absolute sensibility" is tested by ascertaining the lightest weight that will produce a sensation of touch in various parts of the body. The absolute sensibility of course varies greatly in different parts. Experiments made by the German physiologist Goldscheider tend to show that there are certain minute spots in the skin, called "pressure spots," which are specially sensitive to touch. This is shown by exploring the surface of the skin very carefully with a blunt-pointed needle or a horse-hair.

(*b*) Comparative discriminative sensibility is tested by placing one small weight after another on the same spot, in order to ascertain the smallest noticeable difference. In order that muscular sensations may be as far as possible excluded, the arm or other part tested is supported.

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[1] *Human Mind*, vol. i. p. 104.

(*c*) Local discriminative sensibility is measured by testing the smallest distance between two points (in contact with the skin) which are distinguishable as two.

It must be observed that any localisation at all of our sensations is an acquired perception. We learn to localise at all by degrees. The external stimulus, in the case of sensation, is propagated to the brain; but the sensation is localised not in the brain but in some part of the body. The young child has a very imperfect sense of localisation; he does not localise pain, but has a general sense of discomfort. In abnormal cases we may discriminate the position of a sensation in a part of the body which no longer exists; after the amputation of a limb the patient will still feel pain, for instance, "in" his foot, because he has been accustomed to localise such feeling there whenever particular nerves are stimulated.

Local discrimination, in the case of touch, is most acute in those parts of the body which are adapted for laying hold, both in man and the lower animals. The monkey has this sense equally acute in hands and feet; in man the feet have no longer that acute sensibility. Experiments are made by means of an instrument (such as a pair of compasses) having two points capable of being adjusted to a greater or smaller distance apart. If the patient, who has his eyes shut, can distinguish two points of contact with the skin, the compass-points being at a known distance apart, that is a measure of local discrimination at that part; the distance is narrowed and the result again ascertained, until a distance is reached where the points cannot be distinguished as *two*. The distance at which the points can remain apart and still be distinguished as two differs greatly in different parts of the body. The most sensitive part is the tip of the tongue, where points only one thirty-sixth of an inch apart have been distinguished as two. On the back of the neck or trunk the points may be two and a half inches apart and yet the patient feels only one sensation. The tips of the fingers may distinguish one-twelfth of an inch.

Touch combined with muscular movement becomes one of the most important sources of our knowledge of space-relations, and has been distinguished as active touch. It is when touch is combined with movement that we experience the very important compound sensation which arises when one portion of our body touches another.[1]

On the physiological psychology of touch, see M'Kendrick, *Ency. Brit.*, vol. xxiii. p. 478; Ladd, *op. cit.*, pt. i., ch. v., §§ 8-10; pt. ii., ch. iv., §§ 19, 21; ch. v., § 10 (ref. to Goldscheider's experiments); ch. vi., §§ 29, 30 (physiological theory of local discrimination).

§ 5. *Sense of temperature* (*cutaneous*).—The skin is also the seat of a temperature sense. There seem to be special nerves for conducting heat and cold stimuli, and there may be special end-organs. The experiments of Goldscheider and others point in that direction. He discovered certain "temperature spots" in the skin, some specially sensitive to heat, others to cold.

The information which we get by sensations of temperature is of relative character, not absolute; in other words, a person's sensations of warmth or cold depend on his own state,—they are "subjective." If I have three bowls of water, the first hot, the second lukewarm, the third cold, and if I dip one hand in the first and the other in the third, and then dip both hands in the second, the latter will feel cold to one hand and warm to the other. We may generalise this result and say that anything warmer than the surface of the body will feel warm, anything colder than the surface of the body will feel cold. Bodies having the same temperature as the part of the skin which they stimulate give no distinct sensations of warmth or cold; the normal heat of that part of the body is called the zero-point *of temperature sensation.*

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[1] Ladd, *Elements of Physiological Psychology*, p. 401.

As in the case of touch, discriminative sensibility for temperature varies greatly in different portions of the body. The eyelids are extremely sensitive; the back of the hand more so than the palm. Keen discrimination of temperature is found only near the zero-point. The zero-point is not the same for all parts of the body, since the normal temperature of all parts is not the same; for instance, the hand is usually cooler than the brow. The brow has a keener discrimination of low temperatures than of high ones.

On the physiology of temperature-sensation, see M'Kendrick, *Ency. Brit.*, vol. xxiii. p. 481; vol. xxxi. p. 745. On the experimental psychology of temperature-sensation, see Ladd, *op. cit.*, pt. ii., ch. iv., §§ 22-24; ch. v., § 11.

§ 6. *Sense of hearing.*—The physical cause of sound is vibration. It is necessary that there should be a medium between the "sounding" object and the ear. The vibratory movement of the object can be propagated to the ear through liquids and solids; but the usual medium is air. The vibration of the object is communicated to the atmosphere, producing a wave motion which is propagated until it reaches the ear.

The ear consists of three parts: the "outer ear," the visible hollow and the passage into which it leads;

the "middle ear" or "tympanum," separated from the passage of the outer ear by a membranous "drum"; the "inner ear" or "labyrinth," communicating with the tympanum by two small openings, the so-called "oval window" and "round window." The labyrinth and the tympanum are cavities hollowed out of the skull-bone. (*a*) The air-wave meeting the outer ear is conducted along the passage until it meets the drum which closes the passages; it impinges on the "drum" and drives it slightly inward. (*b*) The middle ear or tympanum is a chamber in which are three small bones—the "ear-bones," the so-called "hammer," "anvil," and "stirrup." The "hammer," which is attached to the drum, serves to "damp" the membrane, so that the latter does not continue to vibrate after the cause of the vibration has ceased. It also serves to propagate (in a modified form) the motion of the membrane; for the "hammer" fits on to the "anvil," which in turn fits on to the "stirrup," and the "stirrup" presses on a second membrane covering the "oval window." This sets in motion a fluid which fills the inner ear, and by which the endings of the auditory nerves are stimulated. (*c*) The inner ear consists of three parts: the "vestibule," communicating with the tympanum by the "oval window"; the "semicircular canals," joining on to the "vestibule" on one side; the "cochlea," joining on to it on the other side and communicating with the tympanum by the "round window." The three "semicircular canals" are passages in the bone, each curved to about two-thirds of a circle, and in planes at right angles to each other. Each canal is about one inch in length (round the curve) and about one-twentieth of an inch in diameter. On joining the vestibule they increase in diameter. The "cochlea" is hollowed out in the shape of a double spiral shell. Within the labyrinth is a membrane which follows the walls of it throughout — the "membranous labyrinth." It is not attached to the walls of the bony labyrinth, but floats freely within it. The membranous labyrinth consists of a vestibular portion formed by two small sac-like dilatations, one of which communicates with the semicircular canals. The membranous portion of each canal consists of a tube, bulging out at each extremity so as to form the so-called *ampullæ*. The cochlear division of the membranous labyrinth consists of a tube (the *ductus cochlearis*) fitting the two cavities of the cochlea, which are called respectively the *scala vestibuli* (because it commences in the vestibule) and the *scala tympani* (because it ends in the tympanum, at the "round window"). The two *scalæ* join at the apex of the cochlea. The fluid within the membranous labyrinth is called the "endolymph," and the fluid between it and the walls of the bony labyrinth is called the "perilymph." The endings of the auditory nerve are distributed to the *ampullæ*, the *ductus cochlearis*, and the vestibular membrane. In the case of the cochlea the nerve has a highly-specialised end-organ (the "organ of Corti"), the exact functions of which have been the subject of much discussion. These various nerve-endings are stimulated by vibrations of the surrounding fluid. The fluid may be set in motion in three ways: by the bony walls of the labyrinth,[1] by the air in the tympanum and the "round window," and by the base of the "stirrup" at the "oval window," by which ordinary hearing vibrations are chiefly communicated.

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[1] "Vibrations of the air in the mouth and nasal passages are communicated directly to the walls of the cranium, and thus pass to the labyrinth. In like manner we may experience peculiar auditive sensations, such as blowing, rubbing, or hissing sounds, due to muscular contraction or to the passage of blood in vessels close to the auditory organ."

In classifying sensations of sound, we find a broad distinction between musical sounds, "tones" or "notes," on the one hand, and non-musical sounds or "noises" on the other. Musical sounds depend on regular or periodic vibrations, noises on irregular or non-periodic vibrations. Musical sounds or notes differ in three ways: quality, intensity, and musical colour or "timbre." The specific qualitative differences are known as differences of "pitch" or "height." They depend on the frequency of the vibrations of the sounding body. If a vibrating string is divided at its middle point, the half string makes twice as many vibrations as the whole did in a second, and the note sounded by the new string is the "octave" of the one sounded by the first. Pitch is the characteristic sound-quality. Differences of pitch are represented by the various notes of the musical scale.[1] We can also distinguish the strength, loudness, or intensity of a note; this is the second aspect of the sensation,—the quantitative aspect. This depends on the amplitude of the vibration, occasioned by the force with which the string is pulled out of its place. In the third place, "timbre" is the quality which distinguishes a note sounded on one instrument from the same note sounded on another instrument, as for instance, the note C sounded with the same strength on a clarinet, a horn, a bassoon, a violin, &c. These differences are due to the fact that no note is absolutely pure: with every note sounded on our instruments certain higher tones are mingled, these being "harmonic" with the fundamental tone. If the note C is struck, a musically trained ear will recognise along with it its first harmonic, the C one octave above it; other harmonics of higher pitch may also be detected. The second harmonic (in the case of the fundamental tone C) is the G, a fifth above the second C. At least ten such harmonics have been experimentally verified. It is the number and intensity of the harmonics which differ in different instruments, and this gives to the different instruments their special character. This is not the only case where sensations which appear to be simple or unitary are really not so from the physiological point of view.

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[1] The ear (except in the case of "note-deaf" persons) can distinguish much finer differences of pitch than the "tones" and "semitones" contained in the musical scale. In fact, if the rate of vibration is gradually increased or decreased, we experience a *continuous* change of pitch.

The limits for perception of notes, as notes, run from 16 vibrations per second to between 30 and 40 thousand. Below 16 we should not hear the vibrations, but feel them as puffs of wind. Musical notes range from about 30 vibrations per second to about 4700. At the upper limit of hearing people differ very much. The chirp of a cricket or the squeak of a bat is inaudible to some; but the power of hearing high notes has nothing to do with *acuteness* of hearing.

When two or more musical sounds occur together, we have harmony or discord. This depends on the proportions of the rates of vibrations; thus, when one note is produced by a rate of vibration twice as fast as that of another, we have the most perfect harmony, the octave. Then we have the "fifth," where the proportion is two to three; the "fourth," where it is three to four; and so on, up to a point where the harmony fades away into discord. The harmonious connection of notes in succession (melody) and simultaneously (harmony proper) constitutes the art of musical composition, complicated with other effects produced by time, emphasis, contrasts of intensity, &c.

Sounds and noises may vary in massiveness or voluminousness. "This happens when the sound comes from a sounding mass of large surface or extent—for example, the shout of a great multitude, the waves of the many-sounding sea, the thunder, or the wind," when compared with the sound of a single voice or the trickling of a stream. This brings us to non-musical sounds or noises. The precise nature of the effect which they produce is not understood: there is little doubt, however, as already remarked, that they involve a rapid and irregular variation of rates of vibration; so that many noises are really a combination of numerous constituent sensations. Many noises involve an element of tone (regularity of vibration); hence the "music of nature."

The classical treatment of sound-sensation, from the point of view of physiology, of physics, and of psychology, is in Helmholtz's great work, *The Sensations of Tone* (Eng. tr. by A. J. Ellis). Stumpf's *Tonpsychologie* perhaps comes next in importance. The reader will find a concise discussion of the main physiological facts in Professor M'Kendrick's articles in *Ency. Brit.*, vol. vii. pp. 591-594, vol. xxxi. pp. 750-753. See also Ladd, *op. cit.*, part i., ch. v., §§ 23-31 (end-organs), part ii., ch. iii., §§ 16-23 (quality of sound-sensations), ch. v., §§ 12-15 (intensity), ch. vi., §§ 19, 20 (perception); and the sections *Sound* and *Auditory Sensation* under the reference "Hearing" in Baldwin's *Dictionary*.

§ 7. *The sense of sight.*—The physical stimulus of vision consists of vibrations of the *ether*, a medium pervading all space, and not "material" so far as "material" means "having weight" (*i.e.*, answering to the Law of Gravitation); and as the existence and properties of this medium were thought out specially in connection with the phenomena of light, it is sometimes called the *luminiferous ether.* Objects at high temperatures are self-luminous—*i.e.*, capable themselves of starting etherial vibrations, and so stimulating the organs of vision: such are flame, red-hot iron, the sun, the stars, &c. Most objects are visible only by reflection from such as are self-luminous.

(i) The organ of vision, the eye proper, as distinguished from its muscular and other attachments, is a ball with three coverings, surrounding three inner transparent masses. The outer covering, called the sclerotic, surrounds the ball, but in front becomes transparent, and gets the special name of the *cornea.* Within the cornea, extending to its junction with the sclerotic, is a round curtain called the *iris*, with a central opening, called the *pupil*, through which the light enters: the iris is provided with muscles which act reflexly, and enlarge or contract the pupil according to the less or greater intensity of the light. The second covering is the *choroid:* it is very dark in colour, and lines the chamber of the eye to the union of the sclerotic and cornea. Its precise purpose is not known. The third covering, the *retina*, lies within and upon the choroid, but does not extend so far forward. In the retina the process of sight begins. Suspended across the interior of the eyeball, at a distance from the back of about three-fourths of the diameter, is the double-convex "crystalline lens"; this divides the eye into two chambers, of which the smaller one, between the lens and the cornea, is filled with a fluid called the *aqueous humour;* the larger one, behind the lens, is filled with the *vitreous humour.*

Surrounding the lens is the very important *ciliary muscle*, by which alterations in the convexity of the lens are effected, to accommodate the eye to nearer or more distant objects. The contraction of the muscle compels the lens to assume a more convex shape, thus accommodating itself to light proceeding from a nearer object. This is accompanied by contraction of the pupil. Accommodation for the near is the more *active* change;[1] when we look far off, the ciliary muscle is passive and the lens less convex.

The retina, though usually in man not more than one-sixtieth part of an inch in thickness, is highly complicated, and consists of several layers, of which the posterior one, next to the choroid, contains the proper organs of vision. These consist of multitudes of elongated bodies arranged side by side like rows of palisades and vertically to the surfaces of the retina. Some of these bodies are cylindrical, and are called the *rods* of the retina; others are flask-shaped, and are called the *cones* of the retina. The cones are shorter than the rods, and are interspersed at regular intervals among them. The retina also contains minute blood-vessels and nerve-fibres distributed all over its surface; the latter communicate, by means of a complicated apparatus of cells, granules, and branches, with the rods and cones. The rods and cones are the specific organs for taking up the influence of the waves of light; hence, as it has been observed, it is curious that these end-organs "are not pointed forward towards the light as it streams through the pupil, but backwards towards the choroid and sclerotic membrane, so that the light-waves traverse the translucent nerve-fibres and the cellular and granular layers of the retina before they touch the rods and cones themselves." Under certain conditions the shadows of the retinal blood-vessels can be distinctly seen; these shadows fall on the "rods" and "cones" behind the vessels, thus showing that the "rods" and "cones" are the real end-organs of vision. Almost exactly in the centre of the retina is an oval *yellow spot* about .08 of an inch in its long diameter. In the centre of this is a depression, the *fovea centralis*, which is the focus of clear vision for colour, form, and distinctness of impression. Here the "cones" are crowded together without any "rods"; the nerve-fibres bend round it, and the other layers of the retina disappear at this point. "The sensibility of the retina grows progressively less toward its periphery, by means of which neither colours, shapes, nor number of impressions can be well discriminated." About one-eighth of an inch to the inner (nasal) side of the yellow spot is the entrance of the optic nerve into the retina; here the retina is insensitive to light, and this portion of it is called the *blind spot.* The optic nerve is not itself sensitive to light; a process must take place in the "rods" and "cones" first. The optic nerve branches out into the retinal nerve-fibres which we have spoken of, and which communicate with the end-organs at the back of the retina.

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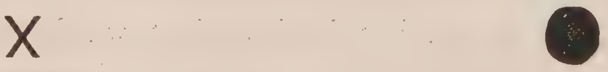
[1] We shall see that convergence (of the two eyeballs) accompanies accommodation, and adds further feeling of activity to the process.

The existence of the "blind spot" can be experimentally verified.



If we shut the left eye, *fix* the right eye on the cross, and move the book towards and away from the eye, a position will be found in which the round spot disappears—that is, when its image falls on the entrance of the optic nerve.

(ii) The eyeball is moved by a set of six muscles attached to it somewhat after the manner of the bridle to the horse's head. Were the retina directly exposed to the stimulation of light without the intervention of the aqueous and vitreous humours, we should have only a diffused sensation of light and colour, comparable in character to the feeling of warmth. The function of the lens and the humours is to refract the rays of light which are reflected from the object, focussing them so that they converge on the retina, and every point in the part of the retina on which they converge corresponds to a point in the object. The eyeball moves almost involuntarily, so that the rays converge *on the fovea*, and here the so-called retinal "image" is formed when vision is most direct and distinct. The fovea of the yellow spot has a diameter of only .008 of an inch. The "image" is thus extremely minute. If we close one eye and fix the other[1] on a word in the centre of this line, "it is clearly and sharply seen, but the words towards each end of the line are vague. If we wish to see each word distinctly, we "run the eye" along the line—that is, we bring each successive word on the yellow spot. . . . Thus the field of distinct vision is extremely limited, and at the same moment we see only a very small portion of the visual field. Images of external objects are brought successively on this minute sensitive area, and the different sensations seem to be fused together, so that we are conscious of the object as a whole."[2]

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[1] To "fix the eye" on anything requires a careful effort of attention. Professor James observes that "it is almost impossible *not* to turn the eye the moment any peripherally lying object catches our attention, the turning of the eye being only another name for such rotation of the eyeball as will bring the *fovea* under the object's image."

[2] M'Kendrick, *Ency. Brit.*, vol. viii. p. 822.

In addition to being extremely minute, the retinal "image" is inverted; strictly speaking, however, it is not an "image," but a process in the rods and cones, which in turn starts a process in the optic nerve; and not until the latter has reached the brain is there any sensation of sight.[1] The student must beware of slipping into language which suggests that the mind, or brain, "sees" the "image" on the retina; any such notion is of course absurd.

(iii) What additional phenomena come into play in the case of *binocular* vision? With two eyes we usually see a single field of vision; but there are really two sets of "images," one on each retina. We "see single" when we converge the axes of the two eyes[2] on the same object, so that its images fall on the two foveæ. In this case there is always single vision. The nearer we bring the object, the greater the effort to converge the axes; this is felt in the muscles. When the axes are accurately converged, each point in the object stimulates what are called *identical points* in the two foveæ. "Furthermore, if the eyeballs, instead of converging, are kept parallel, and two similar objects, one in front of each, cast their respective images on the foveæ, the two will appear as one." This is the first main principle applied in the stereoscope. Were it not for the central partition in the stereoscope we should see three pictures instead of one, —a central one, distinctly defined, and two vaguer ones; for, in addition to the combined picture, each eye would see the picture opposite the other eye. There are

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[1] Light-sensations can also be produced by direct mechanical stimulation of the optic nerve, but not until the stimulus is transmitted to the brain.

[2] The axis of the eye is an imaginary line drawn through the fovea and the centre of the crystalline lens.

"identical" or corresponding points in other parts of the two retinæ; the outer side of one eye corresponds to the inner side of the other eye. When the rays of light from an object fall on corresponding points in the two retinæ, there is single vision; when they fall on non-corresponding points, we "see double."

Some persons' eyes converge almost always with difficulty, and they are always liable to see double. The possibility of double vision may, however, be illustrated in perfect eyesight. If the eyes are focussed on a distant object, and another object is suddenly held up near the eyes, the rays from the near object fall on the inner (nasal) parts of the two retinæ, and it is seen double. It follows that there must be innumerable double images which we never notice: all objects nearer or farther than *the point looked at* will produce them. The only explanation seems to be that we have *trained ourselves to habits of inattention* in regard to these double images; to notice them would not only be useless, but a positive hindrance to vision.

In the case of perfect convergence, the images on the two foveæ must be really a little different. Thus, in the case of a solid object comparatively near, the right eye will see more of one side of it, the left of the other. When this happens the mind judges that what is before it is a solid object. This is the second main principle applied in the stereoscope: the two pictures are photographs taken from slightly different points.[1] The spatial perception afforded by the eye will be further discussed below. The reader will remember that even in the case of perfect convergence the point of single vision is very small, and the two eyes must always be moving and converging on successive points.

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[1] If the pictures are too different, or, say, differently coloured, they are still seen in the *same place;* but since they cannot appear as a single object, they appear there *alternately* displacing each other from the view. This is called "retinal rivalry."

(iv) The peculiar specific *qualitative differences* of sight-sensation are colours. What are called the primary colours are seen when white light is decomposed by the prism; it separates into the seven "colours of the rainbow," red, orange, yellow, green, blue, indigo, and violet. These colours shade into one another, and hence there are intermediate tints beside those named; but the seven colours stand out as obviously and broadly distinct from one another, and constitute the main differences of quality in sight-sensation. They correspond to differences in the number of vibrations per second in the etherial medium.

The succession of colours from red to violet corresponds to a gradually increasing speed in the vibrations; the dullest red light begins when the vibrations amount to about 392 billions per second; the darkest violet light ends when they have risen to about 757 billions per second. Etherial vibrations below those which produce red are exemplified in the phenomena of "radiant heat." The luminosity of the colours increases from red to yellow, and decreases from yellow to violet. Rays vibrating at a rate above those which produce violet (called "ultra-violet rays") do not affect the retina except under special conditions, as in the phenomena of "fluorescence." They have, however, the power of exciting such chemical changes as are produced in photography; of this the effects of the so-called "X-rays" are an example.

By causing two rays, vibrating at different rates, to fall on the same spot of the retina—that is, by mixing rays of light—certain qualities of colour-sensation may be produced, sometimes inaccurately called "mixed colours."[1] Some of these mixed colours correspond to colours in the spectrum. The most important examples of mixed colours which do not occur in the spectrum are *purple* and *white*. The former is made by mixing red and violet rays; the latter, by mixing all the spectral rays together, or by mixing certain pairs of them, which are for this reason called "complementary colours." Thus red and greenish-blue, orange-yellow and indigo-blue, greenish-yellow and violet, all produce white.[2]

The mixing of the rays can be simply accomplished by Newton's method. Take a circular piece of card-board, and paint on it the spectral colours ("pure" or "saturated": see below) in sectors of different angles. Professor M'Kendrick quotes from Newton the angles which the former used, as follows:—

Red	60° 45.5′	Green	60° 45.5′
Orange	34° 10.5′	Blue	54° 41′
Yellow	54° 41′	Indigo	34° 10.5′
Violet	60° 46′		

If such a disk is rotated with great rapidity, it will appear white.

Such facts show that each colour-sensation may be aroused by different combinations of physical causes. There are important physiological theories suggested by this complexity in the facts, carrying out in different ways the assumption of "a limited number of elementary retinal processes to which, when excited singly, certain 'fundamental' colours severally correspond. When excited in combination, as they may be by the most various causes, other colours, called 'secondary,' are felt." The most important theories are those of Helmholtz and Hering. See Professor M'Kendrick's articles in *Ency. Brit.*, vol. viii. p. 824; vol. xxxi. p. 749; also Ladd, *op. cit.*, part ii., ch. iv., §§ 15, 17. Professor James has emphasised the following important point: "The 'secondary' colour-sensations are often spoken of as if they were compounded out of the primary sensations. This is a great mistake. The *sensations as such* are not compounded—yellow, for example, a 'secondary' on Helmholtz's theory, is as unique a quality of sensation as the primaries red and green, which are said to 'compose' it. What are compounded are merely the elementary retinal processes. These, according to their combination, produce diverse results on the brain, and thence the secondary colours result immediately in consciousness. The 'colour-theories' are thus physiological, not psychological, hypotheses."

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[1] Inaccurately, because it is not the *colours* that are mixed, but the physical stimuli.

[2] It will be observed that the mixing of colours, here spoken of, is a process quite different from the mixing of *paints*, with which it has nothing to do.

(v) Besides quality, colours differ in intensity and purity of "saturation." Differences of intensity depend on the extent or amplitude of the vibrations, as distinct from their rapidity, and may range from the most sombre to the most brilliant shades. A great increase of intensity leads to a change of quality; at the maximum of intensity all varieties of colour tend to have a whitish appearance, and at the highest bearable intensity all alike become a dazzling white. At the lowest intensities they seem to fade away into a kind of grey. "In the dark all cats are grey."

Differences of purity or saturation depend on the greater or less admixture of white light with the colour. The colour is said to be saturated when there is no white mixed with it;[1] this is the case with the pure colours of the spectrum. Our ordinary colour-sensations produced by light reflected from objects are never pure. It is possible to vary the degree of purity of a colour by varying the amount of white light mixed with it. The resulting difference is sometimes so marked as to gain a different name. Thus "pink" is whitish purple; "lilac" is whitish violet.

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[1] Here again we are speaking of the mixture of *rays of light*.

When there is no stimulation of the retina at all, we have what is called "black." Whether black is a positive sensation, or whether it is no definite sensation at all, is a question very difficult to settle. The retina itself appears to be always the seat of internal changes which, even in the completest objective darkness that we can obtain, give rise to some faint luminous sensation, called the idio-retinal light.

(vi) Luminous sensations have a duration longer than the actual duration of the objective stimulus. This is due to the "persistence of impressions" on the retina,—the action in the retina goes on for an appreciable time after the exciting cause has passed away. This fact is applied in the well-known "cinematograph" and in a number of toys. It is also illustrated in the method for mixing colour-stimulations to which we referred (the revolving disk). The disk revolves so rapidly that the stimulations are superimposed on the retina. A luminous impression lasts for about one-eighth of a second in the retina, however brief the stimulus may be; hence if two luminous impressions are separated by a less interval, they are not distinguished as two. A flash of lightning is inconceivably brief, but as an impression lasts for an appreciable fraction of a second. After looking at a bright light, if the eyes are suddenly closed, a brief image of the light may be seen. These persistent images are called after-images, but "after-sensations" would be a more accurate designation. They must be distinguished as positive after-sensations, from the negative after-sensations which result from fatigue of portions of the retina. Negative after-sensations are illustrated in such a case as the following: after looking at a bright light, the part of the retina on which the light falls becomes, through fatigue, insensible to light; hence if we look at a comparatively dark background, as the wall of a room, we see there an image of the light in black, owing to the fatigued part not responding to the new light-stimulus. Negative after-sensations are of longer duration according to the brightness of the light and the time we have been looking at it. When the bright object is of some particular colour, the negative after-sensation is of the complementary colour—*e.g.*, red - green. After looking intently at a bright red figure, on turning the eye to a white surface we see a green image of the figure. This is an example of a "complementary after-sensation," a variety of the negative after-sensation.

On the physiological psychology of the sense of sight, see Ladd, *op. cit.*, pt. i., §§ 11-22 (end-organs); pt. ii., ch. iv., §§ 1-18 (quality); ch. v., §§ 16-18 (quantity); ch. vii. (perception by the eye). The classical treatment of the subject is in Helmholtz, *Physiologische Optik.* See also the heading "Vision" in Baldwin's *Dictionary.*

A very clear treatment of the eye as an organ of vision will be found in Professor M'Kendrick's articles already referred to.

§ 8. *Psycho-physical problems connected with sensation.*—We can distinguish between the various intensities of sensations, but our discriminations are very vague as long as we rely on introspection alone. The same remark applies to the discrimination of duration. But *indirectly* mental states can be measured with considerable exactness, by measurement of their physical stimuli. These inquiries form the chief branch of experimental psychology or psycho-physics,[1] and the latter term is often used specially to signify the study of the quantitative aspects of sensation. We shall describe some examples which will give the reader an accurate idea of the kind of question that is dealt with in these studies.

(i) The first main problem is to fix the smallest noticeable sensation (the *minimum sensibile*), the "threshold of consciousness," or the "liminal intensity" of sensation, in respect of the various senses. A very small impression, of sound, for instance, is taken, so small that it is not perceived at all, and gradually increased until it is heard; in this way the threshold value is found; or a loud sound is taken and gradually decreased. The reader will see on reflection that the result obtained will be affected by the possibility of a subconscious sensation (ch. iii., § 4) and the law of Relativity (ch. iii., § 2). However, this gives at least an approximate measure of the "absolute sensibility" of the sense (cf. present ch., § 4).

(ii) The second main problem is to fix the maximum limit or height of sensibility. This measures the receptivity or capacity of the sense. There is in each case a limit beyond which addition to the stimulus produces no additional sensation but injures the organ. These results are more difficult to determine, and cannot be fixed with exactitude on account of injury to the organ. However, between these two extreme limits is the "range of sensibility" within which stimulus gives rise to conscious sensation, and addition to stimulus is accompanied by change of sensation.

(iii) The most important and characteristic problem of psycho-physics yet remains. This is, to determine the smallest *difference* that can be noticed between two sensations of the same sense; and the relation of this sensational difference to difference in the stimulus. As regards the latter question, there is more than one possibility. Is the sensational difference directly proportional to difference of stimulus?—*i.e.*, does every increase of stimulus above a certain amount produce an increase of sensation, and does it always produce the same amount of sensation; or is the relation more complicated? Every increase of stimulus does not produce an increase of sensation; it may be too small to be noticed. Let us suppose that the sense of hearing is being investigated, as regards its discriminative sensibility, and that the threshold value has been reached. We may increase the sound by ever so little, but the increase may be so small that the mind is unable to perceive it. We must always increase the stimulus by a certain amount if the increase is to be noticed. This gives the "difference threshold" or "least noticeable difference." The eye appreciates a difference of one one-hundredth; sound requires an increase of one-third; the muscular sense of one-seventeenth (Wundt). Different parts of the skin, as we have already remarked, differ very much in discriminative sensibility, as do different parts of the retina.

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[1] Refer to ch. ii., § 6.

The determination of the least noticeable difference is not at all a simple matter, when scientific precision is required, and not merely the satisfaction of curiosity. Extreme care has to be taken to avoid errors, or rather, since they are unavoidable, to make due allowance for them.

The first method "consists in gradually adding to a given stimulus small amounts which at first cause no perceptible difference in sensation, but at a certain point do cause a difference to emerge in consciousness; or *vice versa* in gradually decreasing the amount of additional stimulus, till the difference originally perceived becomes imperceptible. By taking the average of a number of such results, the minimum may be determined with tolerable accuracy. The second method is known as the method of 'correct and incorrect instances.' When two stimuli are very nearly equal, the subject will often fail to recognise which is the greater, saying sometimes that A is greater, sometimes that B is greater. When in a large number of trials the right and wrong guesses exactly balance one another, we may conclude that the difference between the two stimuli is not appreciable by the sense. On the other hand, as soon as the number of correct guesses definitely exceeds half of the total number of cases, it may be inferred that there is a certain subjective appreciation of difference. The third method, that of 'average errors,' is very similar to the one just explained. Here a certain weight (to take a concrete example) is laid upon the hand of the person experimented upon, and he is asked, by the aid of subjective impression alone, to fix upon a second weight exactly equal to the first. It is found that the second weight sometimes slightly exceeds the first, sometimes slightly falls below it. Whether above or below is of no consequence to the method, which depends solely on the amount of the error. After a number of experiments the different errors are added together, and the result being divided by the number of experiments, gives us the average error which the subject may be calculated upon to make. This marks the amount of stimulus which is just below the difference-threshold for him."[1]

The chief investigation to which these inquiries lead up has still to be explained. Does the difference-threshold represent always the same absolute amount of stimulus, or what is the relation of increase of stimulus to increase of sensation? There are a great many facts which go to show that the same stimulus does not always produce the same amount of sensation. In the night we hear sounds unnoticed in the daytime. The stars are invisible by day. One and the same stimulus will be felt either more or less intensely, or not felt at all, according to circumstances. A stimulus to be felt may be so much the smaller if the already pre-existing stimulation of the organ is small, but must be so much the larger the greater the pre-existing stimulation is. The simplest relation would be if the same stimulus always produced the same effect. The real rule is that the smallest perceptible difference is not absolutely the same but remains *relatively* the same—*i.e.*, it remains the same fraction of the preceding stimulation. The fraction remains constant whatever the absolute value of the stimulus with which we start. Thus, if we could distinguish between two weights of 17 and 18 ounces by lifting them in our hand, — that is, if we could distinguish an increase of one-seventeenth,—we should not be able to distinguish between 34 and 35 ounces; we should require to add not merely one ounce but the same relative amount — *i.e.*, one-seventeenth or two ounces. The generalisation to which these researches lead was first formulated by Weber, and its exact numerical statement investigated by Fechner; hence it is known as "Weber's Law" or "Fechner's Law." It may be formulated as follows: "In order that the intensity of a sensation may increase in arithmetical progression, the stimulus must increase in geometrical progression." This law has been explained physiologically, as due to the nature of nervous action, or, on the other hand, as due to general psychological laws; thus, it may be due to the fact that as a nerve is stimulated it gradually loses its sensibility, so that a stronger stimulus is needed in order that any effect may be produced in the cortical centre belonging to that sense; or it may be due, as Wundt thinks, to the general psychological law of relativity, according to which the conscious effect of a psychical state depends upon previous psychical states. It is very doubtful whether this can be made to cover the facts.[1]

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[1] From Professor A. Seth Pringle-Pattison's article, "Weber's Law," in *Ency. Brit.*, vol. xxiv. p. 470.

Weber's Law is true only approximately and within certain limits. Experimental verification of it in the case of taste and smell has not been possible: it is not possible to limit the amount of stimulation, and the results are vitiated by the long continuance of the effects. In the case of temperature the results are uncertain. The Law has been approximately determined in the case of hearing, sight, pressure, and the muscular sense, and most accurately in the middle regions of the sensory scale. Towards the upper and lower limits the results become quite uncertain.

(iv) Another series of problems arises in connection with the measurement of duration. The rate at which nerve-force is transmitted is known, and hence it is possible to measure the time taken to perceive a sensation and react on it. Thus if the skin be touched, and the person has to give a sign immediately he feels the touch, the time between the stimulus and the response is called "simple reaction-time." It consists of (1) the stimulated action of the end-organ and transmission of the stimulation to the centre; (2) a central or mental process; (3) stimulation of the motor centre and transmission of the stimulus through a motor nerve to the nerves of articulation or the hand, with the action of the appropriate muscles. The total reaction-time is larger than the sum of (1) and (3); if, then, we subtract these, we get the time occupied by the central process, which is proved to occupy an appreciable amount of time, even if it is only a fraction of a second.[1]

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[1] Cf. Sully, *Human Mind*, vol. i. pp. 87-89.

§ 9. *Are our sensations reducible?*—This question means, is the variety of qualitative differences among our present senses reducible to some one fundamental form of stimulation? In ancient times Democritus suggested that the senses—organic and muscular sensations being excluded—were all reducible to *touch*, because they all depended upon contact with the organ; not always the contact of the perceived body or particles of it, but at least of a medium which is itself set in motion. In modern thought we should set the question in another way: instead of asking which is the most fundamental of our present senses, we should ask, in accordance with the accepted ideas of development and evolution, what kind of sense may we assume to be primitive—*i.e.*, to have developed first in the evolutionary order of living beings? We may assume that in the case of the lowest animals something which by an imperfect analogy we may call a "sense of touch" was the first to differentiate itself from the general vital feeling which must have been the most primitive form of conscious life. Pressure and temperature were in all probability the first senses. When movable appendages have developed, such as the feelers of insects or the cilia of marine animals, we have the possibility of a finer sense of touch. Certain points on the surface would then become differentiated to appreciate taste and smell. At a later stage the first beginnings of the organs of hearing and sight would appear. The Comparative Anatomy of the sense-organs shows that these suggestions are far from being mere speculations. Thus certain *spots in the skin* of some of the lowest animals seem to be the rudimentary organs of vision, for they are sensitive to light. In creatures of a slightly more complicated organisation these spots are beneath the surface, with which they communicate by a nerve-process.

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[1] For a short account of types of reaction, see above, ch. vi., § 8.

This view of the development of the special senses out of a more primitive state of consciousness, harmonises with the true conception of mental development. We have remarked that the earlier English psychologists were in the habit of speaking as if consciousness began with simple or distinct "ideas" or sensations, like discrete atoms, and as if the further progress of consciousness consisted in building up these atoms into more complicated structures. This view influenced psychology for a long time, and played a great part in English philosophy. It is not a true view of the progress of the mind. The starting-point of consciousness should rather be compared to a vague mass of sensation. The nearest approach to such a state is in our feeling of the bodily organism. If we were limited to pure organic sensation without any definite pleasures or pains, this vague mass would represent the starting-point of consciousness. This view is now adopted by all careful psychologists, and is most definitely and strongly defended by Ward, James, and Stout.

It follows that the sensations which we have been speaking of in the foregoing chapter are not primitive facts of mind. They are developed facts of mind, and the experience of them involves the mental activity of discrimination, the discernment of differences in consciousness. They are elementary forms of Perception.

The psychological literature in the department of sensation is vast. Here, in addition to the works already referred to in the previous sections, we may repeat that the whole subject is most adequately dealt with in the elaborate works of Wundt, Ebbinghaus, and Titchener, spoken of in ch. ii., § 6. Külpe's *Outlines of Psychology* gives a careful review of the facts, mainly on the lines of Wundt. The chief facts are summarised in Sully, *Human Mind*,* vol. i., ch. v., and Stout, *Manual*,* bk. ii.

On the psycho-physical problems referred to in § 7, see especially James,* *Principles*, vol. i. pp. 533ff (Weber's Law), pp. 85ff (reaction-time); Ladd, pt. ii., ch. v. (Weber's Law), ch. viii. (reaction-time); Pringle-Pattison, art. "Weber's Law," *Ency. Brit.*, vol. xxiv.; Ward, "Fechner's Law," *Mind* (O.S.), vol. i. pp. 452ff; and the headings "Psycho-physical Methods" and "Reaction-time" in Baldwin's *Dictionary*.

On the simplicity or complexity of our elementary sensations, see James, *Principles*, vol. i., ch. vi. The main point is that physiological complexity is no proof of psychological complexity; "for the psychologist those qualities are simple or ultimate which we cannot further consciously subdivide, even with the help of a previous experience of the sensations which are known to correspond to a separate production of certain constituents of the whole nerve-process involved" (Sully, vol. ii., ch. v., § 9).

The general characteristics of sensation are discussed in James, *Principles*, vol. ii., ch. xvii.

CHAPTER XII.

THE PERCEPTION OF OBJECTS.

THE senses supply us with all the materials of our knowledge, and the process of knowledge consists in the *elaboration* of these materials,[1] according to the processes which we have indicated (refer to ch. iv., § 6). Even our imagination is limited to the material supplied to us,—in other words, we cannot frame a new simple sensation. Such sensations are not definable in the ordinary sense of this word; they can only be explained by reference to experience. We cannot imagine what the perceptions of a *new sense* would be, any more than a man born blind can imagine sensations of sight. We can abstractly conceive the possibility of beings with more or other senses than those which we possess, and hence, with different avenues of knowledge, bringing them into relation with other modes of existence. Such beings may actually exist, but we ourselves are absolutely limited to the materials supplied to us.

§ 1. *Attention as selective.*—We hope that the reader, who has followed our exposition so far, now realises that the general process of mental life is a process of conations. Each of these is a movement towards some end in which the process finds its satisfaction. Some of them may be more transient or slight, others more lasting; and all involve interest and attention.[1]

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[1] The word "knowledge" as used here is limited to "knowledge of our environment, knowledge of things beyond our own consciousness." Our self-knowledge, our knowledge of our own inner life, is not limited by what our external senses supply.

We found that all attention is prompted by interest, —either by interest in the object itself or because of its connection with something else. We attend to what is interesting. And as long as we are, so to speak, mentally *alive* at all, we are interested in something or other. This brings out a characteristic of attention which is of primary and fundamental importance in the whole process of mental elaboration—its *selective action.*

When we attend, we selectively isolate something so that it comes into the centre or the focus of consciousness, and other mental facts pass into the margin or become subconscious,[2] as, for instance, when we are examining one particular detail in a map, or analysing a sensation in order to fix on certain aspects of it to the exclusion of others. And while attention isolates, it combines; what we attend to increases in internal completeness and definiteness, and these various features we attend to *as a whole.*

The connection of attention and interest is simply this,—that objects or ideas which interest us do so because they excite feeling by which attention is prompted. They may excite feeling *directly*, as when a sensation itself, by its suddenness, novelty, &c., becomes agreeable or the reverse, or is so through its own intrinsic quality; or *indirectly*, as when a new presentation arouses feeling because of its connection with a previously acquired stock of ideas. When the ideas are those of the results or purpose of an activity, we have the typical case of borrowed or reflected interest; and we have selective attention in its complete form.[1]

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[1] Refer to ch. iv., §§ 2, 3; ch. vi., §§ 7, 8; ch. vii., §§ 6, 7.

[2] Ch. iii., §§ 3, 4.

We have already implied that the process of mental elaboration does not depend upon interest and attention only, but also upon conditions which we cannot dictate. The material which our senses supply to us is at bottom beyond our own control. Moreover, if mental development is to take place at all, traces of past mental changes must be retained, and must be capable of having an actual effect upon mental changes which follow;[2] and the laws of this "retentiveness" are at bottom beyond our control.[3] It is convenient to describe that side of mental life which is dependent on changes that we cannot control, as "passive," "automatic," or "mechanical," in distinction from changes which can be traced to interest and attention, which are "active" mental changes.

§ 2. *Factors in mental elaboration: Discernment.*—The elaboration of the materials of our knowledge is a gradual process whose operation can be traced at every level of mental development. At a low level it is comparatively simple, and at higher levels comparatively complex. We must distinguish at least three such levels (here given in ascending order), and in each of these we shall give different names respectively to the active and passive sides of the elaborative process. We shall see that retentiveness and attention are essential features in each case.

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[1] Cf. the distinction between interest as "immediate" and as "derived"; ch. vii., § 6.

[2] See ch. iii., § 1, p. 35; § 5, pp. 46, 47; ch. iv., § 1, p. 53.

[3] Cf. p. 90 (reference to the mechanical side of mental life).

ACTIVE MENTAL CHANGES.	PASSIVE MENTAL CHANGES.
1. Discernment.	1. Differentiation.
2. Recognition.	2. Automatic assimilation.
3. Comparative discrimination. Comparative assimilation or integration.	3. Association.

In what follows we hope to make clear the sense in which these terms are used.

By "Discernment" we mean the minimum of intellectual consciousness or "intelligence" which is necessary for a simple change to be discerned,—for a definite impression to be experienced as such, or to stand out (in some degree) against the continuous background of experience. Mere discernment, accompanied by the lowest level of retentiveness, may be maintained without any of the higher capacities of the mind coming into play,—or even before they are developed.

The best illustrations of this are found in the mental life characteristic of the lowest animals, such as fishes. If we take, as the index of psychical life, the capacity for movement in response to sense-stimulus,[1] it would seem that the movements of a fish are prompted and guided by its senses *separately and not collectively*,—in other words, it can *discern* a sensation (it can see, smell, and even hear and taste), but cannot *combine* different sensations into the perception of an object, and very often cannot *recognise* a sensation which recurs. Professor Ward has quoted from a very interesting paper by Mr Bateson (on "The Sense-organs and Perceptions of Fishes") some curious evidence on this point, and has drawn some important conclusions from it. After indicating that the dogfish seeks its food exclusively by scent, and the carp exclusively by sight, he continues: "Again, Mr Bateson observes, 'There can be no doubt that soles also perceive objects approaching them, for they bury themselves if a stroke is made at them with a landing-net; yet they have no recognition of a worm held immediately over their heads, and will not take it even if it touch them, but continue to feel for it aimlessly at the bottom of the tank, being aware of its presence by the sense of smell. Soles, eels, and rocklings, moreover, have a clear appreciation of light and darkness, being always buried or hidden by day (unless food is thrown in), but swimming freely about the tank like other fish at night. When thus swimming at large they bury or hide themselves if a light be flashed upon them. Congers and loaches have some appreciation of moving objects, and occasionally snap at them, but their sight perceptions are extremely vague. . . . Pollack, fishes with excellent sight, take no notice of a *straight* wire held up and waved outside the tank, but if the wire be *bent* into a sinuous curve like the body of a swimming worm, they will often dash at the glass in the attempt to seize it.' When a sense-impression sets up movements that are plainly unfit, we have no choice but to affirm sensation, but it must be unassimilated sensation; the rush of a moth into the candle is perhaps a suitable instance. . . . When the casual spectator at an aquarium sees dead sprats or shrimps thrown into a tank he is apt to assume that the fish who eat them recognise, as he does, a certain smell, taste, form, colour, consistency, and so forth. But presently he may learn that the scent-led feeders among them, such as the rockling, circle round in narrowing spirals, and finally gulp a stone on which a dead sprat has been smeared; while sight-led feeders, like the pollack, will dart straight at and swallow the twisted strip of bright metal which anglers call a 'spoon.' One would think that with time and adequate opportunities they might learn that all is not fish that glitters or that has a fish-like smell, and so pause for some saving differentia that would exclude fraudulent imitations. To *associate* the glitter with the smell or the smell with the glitter would be a great step towards this. A very few instances would probably suffice to furnish a cat or an otter with some such minimum of sagacity; but a fish seems scarcely ever to grow wise."[1] The reason is that the fish cannot combine sensations, even when they recur together or in close succession, into a complex percept of a single object; and, failing this, it has no memory-images of these sensations themselves.

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[1] It will be observed that this is a *wider* test than the one which we applied on a former occasion (ch. iv., § 1), which was the capacity to *learn* by experience.

Nevertheless, retentiveness may be at work. Even if an animal is unable to learn anything from repeated sense-experiences, the experience may still be heightened in intensity or distinctness by traces of its former occurrence, although the persisting effects do not themselves rise into consciousness.

In the same way, when an animal of the mental level of the fish, led by hunger, follows by sight the movements of its prey, it has a series of sense-stimuli a, b, c, d, and each of the impressions affects and makes a difference to the next, so that the *consciousness* of the series may be represented thus: a, bm_1, cm_2, dm_3; where m_1 represents the after-effect of a, m_2 of a and b, and so on; the total effect being a rush to seize the object. Of course m_1 is not distinguished in consciousness from b, nor m_2 from c, nor m_3 from d. The meaning simply is that the consciousness produced by stimulus b is slightly different from what it would have been had a not preceded, and so on. The symbolism is employed by Professor Stout, in representing the act of discerning as a whole a series of impressions which have *continuity of interest* at the level of human mental life.

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[1] *Mind*, N.S., vol. iii., No. 12, pp. 519, 520.

We have given illustrations from animal life because there we find cases where consciousness may never rise above mere discernment. It is, however, by a process of conscious discernment that the child gradually learns to distinguish the sensations of different senses, and then the different qualities, &c., of each kind of sensation. It hardly needs to be said that the capacity for such discernment is slowly acquired, and, partly depending as it does on selective or feeling-prompted attention, is not acquired equally by all. The differences may arise from specialised interests,—as when a metal-worker sees many tints where other people see only a uniform glow; or from mere differences of age,—remarkable variations being found in the capacity for distinguishing colours (for instance) at different ages; or, again, from inborn differences of mental and physical constitution, of which no precise account can be given.

And since the mind does not simply create the changes which are discerned, the occurrence of the change has a comparatively passive or mechanical side. This we call "Differentiation." If light, for example, did not differentially stimulate a particular area of the retina, and so differentially affect consciousness, there would be no special direction of the attention, and hence no special sensation experienced. A vague differentiation must precede the special process of discernment.[1]

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[1] The more difficult questions to which this consideration gives rise are pointed out by Sully, *Human Mind*, vol. i., ch. vii., § 2 (p. 171), and discussed by Stout, *Analytic Psychology*, vol. i., bk. i., ch. iii. (esp. p. 63).

§ 3. *Recognition.*—An animal capable only of what we have called Discernment is not capable of learning by experience. What we mean by "learning from experience" is illustrated in the case of the bird and butterfly (p. 52) and the caged cats (p. 159). The following, from Lloyd Morgan's *Habit and Instinct*, is a very instructive example: "A young chick two days old had learnt to pick out pieces of yolk from others of white of egg. I cut little pieces of orange-peel of about the same size as the pieces of yolk, and one of these was soon seized but at once relinquished, the chick shaking his head. Seizing another, he held it for a moment in the bill, but then dropped it and scratched at the base of his beak. That was enough; he could not again be induced to seize a piece of orange-peel. The obnoxious material was now removed and pieces of yolk of egg substituted, but they were left untouched, being probably taken for orange-peel. Subsequently he looked at the yolk with hesitation, but presently pecked doubtfully, not seizing but merely touching. Then he pecked again, seized, and swallowed."[1]

Here we have the first signs of *the perception of objects*, which begins with an elementary form of *recognition*. The process described in the last section may indeed be called perception, if we add "elementary" or some similar qualifying term; mere Discernment will not give the perception of an object, nor even any kind of recognition. But even at this second level it is not *necessary* that there should be any separate or distinct recalling of a past experience; it is enough if the previous experience leaves behind it a cumulative effect. This gives to the recurring experience a feeling of familiarity, which is pleasant or unpleasant according as the consequences on the former occasion were one or the other. The cumulative effect of the first experience does not itself emerge into consciousness as a separate item or factor; but it makes so much difference to the second experience that the action is different.

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[1] Morgan, *op. cit.*, p. 40.

This kind of retentiveness plays a great part in the animal mind and in the first developments of the infant mind. We shall call it "Assimilation"; and the mark of it, as we have said, is the capacity to learn by experience. The feeling of familiarity which it causes need not be definitely pleasant or unpleasant; it may lead to entire indifference, so that no attention is aroused. This happens with many of the most familiar recurring experiences of our daily life. But when it does give rise to definite feeling it is rightly described as the beginning of the perception of an object. The sensation, with which the effects of past experience are assimilated, is no longer a mere sensation. We do not merely discern it and act reflexly in response. The effects of past experience have given it a *meaning;* and though at this level it is only a felt meaning, it leads to the modification of action and is the beginning of knowledge.

We can distinguish cases where the meaning is not merely felt and acted on, but begins to be *known to be of such and such a kind*, although even here there are no separate ideas of the past. This is most commonly experienced when sensations of sight are qualified by the effects of their past union with sensations of touch or with motor sensations. We look at a suit of polished armour, and say at once that it *looks* smooth, cold, hard, &c. The sight-experience is altered by the effects of previous touch-experiences, which are just distinct enough to enable us to describe the "look" of the thing in this general way. And we shall see that so common a fact as space-perception consists (in part) of incompletely-revived motor and tactual experiences.

Mere perception, perception uncomplicated by distinct ideas of memory or imagination, does not go beyond what we have just described. The essential of perception is the combination of two or more sensations and their qualification by the effects of previous sensations; these effects being distinct enough at least to determine action, if not also to be themselves named. A person who had lost all ideas of memory or imagination might still retain the capacity of perception; he would be able to *use* all familiar objects rightly, and to *describe* them when present to his senses; he might even understand the practical meaning of words (in the absence of the corresponding objects) so as to be able to do what he was told; but he would have no idea of anything not present to his senses.[1]

§ 4. *Discrimination and integration.*—When free ideas of memory and imagination disengage themselves from the vague background of past experience, we have a further development of retentiveness, which may be distinguished as *Association.* In this case the traces left by past experience are strong enough to produce ideas which are recognised as representing the past, and which can be compared with and distinguished from the present experience, and to that extent are independent of the latter. In the adult human mind mere perception (unattended by free ideas) rarely occurs; the processes of perception and ideation run into one another, and the ideas are regarded as part of the perception.

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[1] For a short account of such a case, see Stout, *Manual*, 2nd ed., p. 251; for some details of other and partial affections of the same kind, see Ward, *Mind*, N.S., vol. iii., No. 12, pp. 511-516, where it is also shown that the capacity for Discernment of sensation may be lost while ideation remains intact.

The laws, or rather the law, of Association will be explained in the following chapter. At this point we only wish to illustrate the way in which a percept, in the stricter sense of the word (§ 3), may be overlaid with ideas from past experience. I am walking along a country road and see in the distance a dark object moving on the road. No sooner have I discriminated it than I am unable to shake off the suggestion that it is my friend M. As I continue on my way I expect to see the familiar form, and should be surprised if it turned out to be, say, an old woman or a labourer. The physical stimulus arouses only an ill-defined sensation, or small group of sensations, of colour. With this is assimilated (§ 3) enough traces of past experience to warrant the recognition of the percept as that of a human being; and this now becomes surrounded with a small army of qualities, memory-images, for which there is no direct sense-warrant. My final perception is strongly biassed by the images which have combined with the initial percept. These images are themselves controlled by some conscious or subconscious interest in the mind at the time. Had I not any focal, or marginal, or subconscious thoughts in my mind concerning M, my perception of him at such a distance would have been an entirely abnormal event.

When these accessory images are less definite and insistent, we may hesitate as to what the object is; rival images, none of them clear enough to expel the others, arise; then we begin to reason as to the probabilities of the case. This is distinct, conscious inference. Even the reading of an image into the initial percept has been called by some writers "subconscious inference" (or, inaccurately, "unconscious inference"); and it may be called inference because there is a combination or synthesis of presented and represented facts into a new whole, and then a statement of what the whole is.[1]

At this level we find that the elaborative process begins to assume its characteristic form, due to subjectively-initiated Discrimination and Integration. Discrimination means the clear apprehension of two different percepts as distinct, with special attention to the features in which they differ. Integration means the clear apprehension of two percepts as distinct, but with special attention to the points of resemblance. Both processes may take place without explicit revival of ideas,—for example, in comparing two faces which are alike in some respects, unlike in others,—but neither Discrimination nor Integration is possible below the level of Perception (§ 3).

These two processes are both included in Comparison, and neither of them takes place without some degree of the other. If we are to attend to the *resemblance* of two percepts, we must distinguish them as two, and so as differing in place or time, if not in other ways. And if we are to attend to their *difference*, we must recognise that they differ in some common quality,—size, form, colour, &c. If we can find no common aspect by which to compare them, we cannot say definitely how they differ.

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[1] This corresponds to the essential nature of all inference, which is the combination or synthesis of certain *data* (the "premises") into a new whole (the "conclusion").—See Mellone, *Logic*, 2nd ed., pp. 226, 227.

Although Comparison may begin at the level of mere Perception, it cannot be carried far, and cannot lead to further development of intelligence without the co-operation of Association. Even when both objects are present to the senses, Comparison seems to involve a transition of attention to and fro between them; and this involves the action of memory,—above the level of very simple cases. Without association it would not be possible through memory to compare our past experiences with our present ones; and when we compare past and future, or compare different possibilities of future action or of the course of events, both objects are ideational.

The student will see that the three levels of intellectual process, which we have analysed, are connected thus. Discernment, the mere emergence of some sensation against its vague background, is the most elementary process. Recognition includes Discernment and something more; the "something more" is, at the least, a feeling of familiarity modifying conduct. Comparison includes Recognition and Discernment; as it progresses it complicates these with ideational elements through Association; and it may act (in complete independence of a perceptual basis) in the world of ideas alone.

The different factors of mental elaboration are very carefully explained and distinguished by Professor Stout, *Manual*,* bk. i., ch. iii., and bk. iii. (i.), ch. i. Mr Sully, *Human Mind*,* vol. ii., ch. vii., describes the various factors very well, but fails to arrange them clearly according to difference of mental level. It is also an improvement to distinguish (as we have done) between what have been called the "active" and the "passive" or "mechanical" aspects of the process. What we have called "simple assimilation" and "integration" are called by Sully "automatic assimilation" and "comparative assimilation" respectively. The former, he rightly says, provides only for a vague sense of familiarity; the latter is a definite comparison and apprehension of likeness. Mr Sully appears, however, to exaggerate the affinity between the mechanical or automatic side of the two processes; automatic assimilation, he says, is "the calling up by a present sensation of the trace or residuum of a past sensation (or sensations), which trace *merges in or coalesces with* the new sensation, being discernible only through the aspect of familiarity which it imparts to the sensation" (vol. i. p. 181; italics ours). If this means that when (for example) we have an old sensation, and a new one *like* it, there are two distinct processes, (*a*) the revival of the trace of the old sensation, and (*b*) the coalescence or fusion of this trace with the new sensation, then we must insist that there is no evidence for (*a*) as a distinct process from (*b*).

Mr Sully justly observes that "just as a subconscious stage of the sensation precedes and determines the reaction of attention on this sensation, so a vague impression of two different sensations precedes attention to them as different; at the same time, it is evident that such a vague awareness of different sensations is not to be confounded with the clear consciousness of them as different which follows on a direction of the attention" (*Human Mind*, vol. i., ch. vii., § 2, p. 171). In fact it is clear that a differentiation, at whatever level it occurs, must be *felt* in order to be *known* ("feeling" here stands for the vague immediate experience referred to above). In certain cases, and very familiar ones, a definite judgment of Comparison is made on a basis of similar immediate experience without attention to both the objects. Of two successive sounds, we can directly perceive the second to be louder or softer without reproducing a *memory-image* of the first. Experiments on the "least noticeable difference," in the case of sensations, afford further illustrations. Such facts suggest that Professor James is right in affirming that, in simple cases, such as the comparison of purple with blue and with red, there may be a similar direct experience or feeling of "simple resemblance," when both objects are present to sense (*Principles*, vol. i. p. 532). This is questioned by other writers (cf. Stout, "Resemblance, consciousness of," in Baldwin's *Dictionary;* and the related topics, "Identity, apprehension of individual," and "Identity, apprehension of material").

The consciousness of resemblance, and its relation to the adjustment of attention, is examined by Ward, art. "Psychology," p. 80.

Complete treatment of the topic "Comparison" belongs of course to the psychology of Ideation (see Stout, *Manual*, bk. iv., ch. iv., § 3; *Analytic Psychology*, vol. ii., ch. ix.)

§ 5. *Primary and secondary qualities.*—In this chapter we shall analyse the process of the perception of objects in space and time (perception as understood in § 3, above). This inquiry is limited to the perception of single objects or groups of objects. The perception or knowledge of the *external world*—that is, of objects and events as interconnected into a unified system—is possible only at the higher level of conceptual thought, language, and intercourse between mind and mind.

The perception of an object involves the combination of different qualities; it is always an act of synthesis. A distinction has come down to us—first drawn by the Greek philosopher Democritus—between two kinds of qualities ascribed to perceived objects.[1] The psychological importance of the distinction rests on the relation of the two kinds of quality to our muscular activity. The "primary" qualities are solidity, extension (including form and size), distance and direction

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[1] For history of the distinction, see Descartes, *Meditations*, pt. iii.; Locke, *Essay*, bk. iii., ch. viii.; Hamilton, *Reid's Works*, note D; and heading "Quality and *Quale*" in Baldwin's *Dictionary.*

(including motion and rest); the "secondary" qualities are colour, sound, temperature, smell, taste. There is good reason, as we shall see, for believing that our muscular sensations play a much larger part in the apprehension of the primary than in that of the secondary qualities. The primary qualities are *psychologically* more fundamental; that is, if we had not acquired any perception of solidity, extension, &c., we should not regard colours, sounds, &c., as qualities of "things" occupying space to the exclusion of other "things."

A perceived object is qualified in the following ways (we are now referring specially to the "primary" qualities and their derivatives): (*a*) it has comparative independence,—it does not cease to exist when we cease to act on it; (*b*) it has spatial qualities: (1) it is solid or resistant—*i.e.*, it *fills* space; (2) it has a certain form and size, and it is situated at a certain distance and direction (our own body being, in the last resort, the starting-point or point of spatial reference); (*c*) it has other qualities besides those which we perceive, and some perhaps which we have never perceived; (*d*) although its qualities are many, and are liable to change, it remains (within limits) one and the same thing.

§ 6. *Perception of external reality.*—The "externality" of the perceived object means, not simply its being "in space," but its relative or partial independence of our control. It is something to which, by active adjustment, we have to adapt ourselves, because it is partly beyond our control. It must be remembered that we are speaking of a level of experience which has not risen above mere perception, and in which all activity is that of muscular movement.

For a case where there is no such independence of sensation with respect to movement, consider the motor or kinæsthetic sensations (ch. vii., § 2); these arise, and only arise, from the changing states of muscle, joints, tendons, &c., which accompany movements of the body and limbs. They simply *are* our internal feeling of these movements. We never regard these sensations as qualities of external things. Yet, in the case of the external senses, the processes which the psychologist calls sensations are never, in common life, regarded as mere "sensations"; they are regarded as sense-qualities of things.[1] This is first of all because changes in these sensations can be distinguished from feelings of muscular movement, and can be to a greater or less extent controlled by muscular movement, but always within limits dictated by something else. I open my eyes, and by moving them or moving my head I can control the fact of "what to look at," but the general way in which visual objects are presented to me is beyond my control. I move my arm, and so control my tactual experiences, but the control is limited by conditions which fix the fact whether my movements shall be impeded or not, or the kind of resistance that they shall receive.

Professor Stout has expressed this general conclusion by saying that the perception of externality first arises in connection with *motor adaptation* in striving towards an end—*i.e.*, in conation. "Motor adaptation involves at once and in intimate union the partial dependence and partial independence of sense-experience in relation to motor control; so far as sense-experience is merely dependent on our motor activity, we do not apprehend it as qualifying an external object; so far as it is relatively independent, we do normally apprehend it as qualifying an external object" (*Groundwork of Psychology*,* ch. ix., and *Manual*,* bk. iii. (ii.), ch. ii.) This is a wide generalisation, and includes a factor on which great stress was laid by the earlier English psychologists—the "perception of resistance." Mr Sully (vol. i., ch. viii., §§ 2 and 3) regards perception as essentially an apprehension of objects *in space*—"an apparently immediate and sensuous apprehension of an object now present in a particular locality."[1] This is of course what perception is, as a matter of psychological fact; but from the scientific point of view, we must question the sufficiency of such statements. The essential point is not simply that the object which is "real" is in space, but that it is controllable by our motor activity up to a certain limit not fixed by *us*.

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[1] Unless in the case where for some reason we regard the body or part of it as an external object—*e.g.*, we can tire out a muscle, and then we should say, "My arm is rather tired, but I am not" (see present section, below).

It is usually said that "external objects" are "things and events presented in space-perception considered as existing independently of the process by which they are perceived." This is quite true; in perception various sensations are regarded as sense-qualities of an object which is independent of the perceptive process. But again we must ask, Is this the essential point? There is no perception without conation; and the primary meaning of "external reality" has reference to the conation.

§ 7. *Perception of the body.*—There are groups of sensations and feelings — besides motor sensations — which are not regarded as qualities of external objects: bodily pleasures and pains, instinctive emotions (ch. ix., § 6), sensuous and bodily appetites and impulses. The reason is that these are not controlled or changed as a consequence of muscular movements, unless it is by movements which they themselves have prompted.

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[1] The same writer points out the interdependence of the perception of space and that of material reality, and makes the "sense of resistance" the essential factor in the perception of material quality (*ibid.*, §§ 8 and 9).

They are experienced as themselves the immediate antecedents of muscular movements.

At the level of perception these sensations and feelings are the central contents of *the self*, and are not distinguished from the body. The "common sense" of the adult human mind distinguishes the agent from his body; but at the merely perceptual level, this distinction has not arisen; the self is the bodily self.

As far as *touch* is concerned, the body is the first object we become aware of as resisting and extended.

The young child explores his own body as much as, or more than, anything else. This combines motor sensations with innumerable sensations of touch all over the surface of the body, and these tactual experiences have qualitative differences corresponding to the different parts that are touched.[1] On the other hand, movements of the body bringing it into contact with external objects are also followed by tactual sensation. But between the two cases there is this extremely important difference: the child actively touching his own body feels a sensation of *double contact*,—in the part which touches and in that which is touched: when he actively touches an external object, he feels a sensation of single contact. This fact is of fundamental importance for the perceptive distinction of the body from things outside it. When an external object touches the body not as a consequence of a movement of the latter, the experience has been called "passive touch" (to distinguish it from the "active touch" mentioned already), and in this case there is a like sensation of single contact. So far we have spoken of touch alone. But *vision* unites with these tactual and motor sensations to make the perception of the body still more definite. In cases of touch—whether one part of the body touches another or touches an outside object—there is *visible contact* along with the tactual sense of it. With this visible contact many kinds of pleasures and pains (bruises and other hurts) are immediately connected. Moreover—as we pointed out in the preceding section—visual (as well as other) sensations are changed in consequence of bodily movements which are felt (by motor sensations) and seen as such. Finally, it must be pointed out that the surface of the body is always in a state of excitation,—quite apart from the special sensations due to actual contact; our temperature sensations, even if of internal origin, are localised there. These various factors form the psychological basis of the distinction between the body and a world of things outside it.[1]

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[1] Cf. what is said below on "local signs."

The essential *difference* between the body and the things outside it is, that the body is always with us, and is inseparable from our self (through the union of organic and muscular sensations);[2] the essential *resemblance* is, that one part of the body can perceive another, just as it can perceive objects outside it.

§ 8. *Perception of "things" or "objects."*—The world outside the body is perceived as consisting—so to say—of units, called in ordinary language "things."

We must leave the word "thing" out of account, as being hopelessly unscientific, whatever its practical usefulness may be. We use the term "external object" instead. An "object" has a certain independence or title to exist in its own right, and not as a mere adjective of something else. It is a term applied or denied to portions of the external world as suits the purpose immediately in hand; for certain purposes a waterfall, a rainbow, or even a flash of lightning, may be regarded as an object. And the object is "the same" as long as it suits our practical or scientific purposes to regard it so. When, however, we pass from the inanimate world to the world of organic life—the vegetable and animal kingdoms — we find "objects" possessing an identity and permanence of their own which cannot be affirmed or denied merely according to our convenience. On the whole, it is true to say that we regard a living thing as the same, as long as it lives.[1]

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[1] In what has been said here, we have suggested some (not all) of the psychological factors of space-perception: this we treat in detail below.

[2] The psychology of the idea of self at higher levels is dealt with in our concluding chapter.

The independence of external objects raises a difficulty of long standing. A perceived quality of an object—*e.g.*, the colour of an orange—seems to be at once a sensation and a state of the object; that is, at once a psychical state which exists only when it is experienced, and an objective quality which is relatively permanent, whether experienced or not. Previous to analytic reflection, these two do coalesce in one unanalysed total object, so that the sense-presentation appears to possess the independence and self-subsistence of the external object, and the external object appears to be given with the same immediacy as the sense-presentation. This appearance cannot be wholly true, for as it stands it is self-contradictory; the sense-presentation is dependent on the perceiving mind, and its psychological characteristics vary for reasons which do not affect the objective quality perceived. Take the case of a person who has difficulty in focussing the two eyes jointly on an object. Such a person has only to let his unaided eyes rest on any object, of moderate dimensions, a few feet distant, and then (unless he makes a special effort to prevent it) there will be two images. Each of these visual appearances is an actual group of sensations having positive characteristics of its own. They are mental facts, as real and as distinct from each other as any two groups of sensations could be. This is an extreme case of a class of innumerable others—*e.g.*, the apparent variations in the size of an object owing to our movements are *as sensations* not "apparent" but quite real. Hence the object cannot be simply identified with its sense-presentation. The identification is true to this extent only, that the sensation and the objective quality perceived have a common basis. There are certain *elements in* the sensation which are not merely dependent on the mind, because they "express the nature of something existing independently of the mind which experiences the sensation"; but "only certain partial aspects and features of our sense-experience assume this function." This solution is suggested by Professor Stout, *Groundwork of Psychology*, pp. 38-40, and article, "Things and Sensations," in *Proceedings of the British Academy*, vol. ii. The features of our sense-experience, to which he alludes, are those arising out of the contrast between activity and passivity.

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[1] On the conception of objects as having an "essence" or "nature" of their own, see Mellone, *Logic*, 2nd ed., pp. 155, 156.

The familiar distinction between animate and inanimate objects is of comparatively recent origin in the history of the human race. One of the strongest and most deeply-rooted mental habits of primitive mankind was to personify everything. The imagination of the undeveloped man, or the young child, ascribes life and consciousness to everything that moves. The researches of Tylor, Spencer, Lubbock, and others have shown that among primitive men this tendency ruled their whole thought of the world: "the savage is ready to treat trees, plants, rocks, rivers, and all kinds of inanimate things, as willing, thinking, feeling, more or less as he himself does." He attributes to natural objects some or all of the characteristics of personality,—of course of personality as it is experienced at the perceptual level, where it consists mainly of feelings, movements, and acts of perception.

What has really happened in the mental development of the race is this. The thought of self and the thought of an outer world arose together and grew together; and the opposition between them is the result of long and late development. It was inevitable that the contents of the two ideas should be originally similar; the agent's visible body moves and resists, and outer visible objects move and resist. There has been a gradual "depersonification" of nature, which leads to a separation of the beings in the world around us into two classes, "animate" and "inanimate." We draw the line somewhere in the borderland where the animal kingdom ends and the vegetable kingdom begins.

The personifying tendency has been called "self-projection" (Stout,* *Groundwork of Psychology*, ch. ix., pp. 97-100). See also Ward, article "Psychology," pp. 81, 82; Baldwin, *Mental Development in the Child and the Race*; and headings "Animism," "Anthropomorphism," and "Personification," in Baldwin's *Dictionary*.

§ 9. *Space perception: not given by movement only.*—The developed perception of space is a perception of a special kind of relations between objects which, as we say, are "in space." These relations may be summed up under two heads: (*a*) motion, (*b*) coexistence. (*a*) Objects are perceived at various *distances* and *directions*,—the percipient himself being, directly or indirectly, the point of reference (*form* and *size* can be brought under this head, as consisting in distance and direction of parts within an object). The meaning of these terms is not, however, fully brought out unless we introduce the idea of *motion*. A thing may move along a line for any distance in any direction if unresisted by other things; and the line itself may move in any direction. Any such motion is *continuous*, and consists of a continuous *series of positions.* (*b*) But the perception of space is not only that of distances and directions regarded merely as quantities that can be covered by so much motion. We get at the most essential mark of perceived space when we consider the meaning of such expressions as we use in speaking of one thing as being *above*, *below*, *outside*, *inside*, another. The relation which we have in mind is expressed by the term *co-existence*—or, if we may coin an English word, side-by-sideness — as distinguished from mere *succession.* In mere succession, one thing is over before the next begins; in space, both may exist at the same time "side by side."

We must not confuse space as *conceived* and space as *perceived.* "Properly speaking, there is no *perception* of space considered as an individual unity boundless in extent and comprehending within it all the places and distances of the contents of the physical universe: this is a concept, not a percept." The same is true of the various kinds of space treated of in modern Geometry.

Psychological theories of space-perception have been divided into "nativistic" and "genetic" theories. These names, to a certain extent, "beg the question" —so far as they suggest that theories of the latter type succeed in giving some kind of explanation which the others fail in giving. However, it is true that the extreme form of the "nativist" theory holds that space-perception is psychologically a fact behind which we cannot go, so that no account of its development can be given; on the other hand, the extreme form of the "genetic theory"—the "purely empirical" theory, as it has been called—in professing to explain space-perception, explains it *away*, since, in the words of its clearest exponent (J. S. Mill), its net result is to conclude that our perception of space "is at bottom one of time."

Professors Stout and Baldwin state the contrast thus: "The purely nativist theory maintains that all perception of extension is due to original endowment, so that it can no more be accounted for by psychological conditions than the perception of colour or sound. The purely empirical form of the genetic theory wholly denies both that the perception itself is a form of original endowment, and that it contains any constituent factor exclusively belonging to it which is due to original endowment (and so incapable of psychological explanation or derivation)."

We shall first take up the purely empirical theory in its most characteristic form, as it was maintained by Bain. We quote from a very clear summary of it (partly in Bain's own words) in Mill's *Examination of Hamilton's Philosophy*, ch. xiii.: "Bain recognises two principal kinds or modes of discriminative sensibility in the muscular sense [for the present Mill has set aside visual perception; the analysis consists largely in the reference of space-perception to the muscular sense]: one corresponding to the degree of intensity of the muscular effort and the amount of energy put forth; the other corresponding to the duration, the longer or shorter continuance of the same effort. The first makes us acquainted with degrees of resistance which we estimate by the intensity of the muscular effort required to overcome it; to the second we owe our idea of extension. By it we discriminate the extent of range of a movement. 'When a muscle begins to contract or a limb to bend, we have a distinct sense of how far the contraction and the bending are carried. . . . If the sense of degrees of range be thus admitted as a genuine muscular discrimination, . . . it gives the feeling of linear extension, inasmuch as this is measured by the sweep of a limb, or other organ moved by the muscles. The inward impression corresponding to the outward fact of six inches in length . , . is the impression of a muscular effort having a certain continuance; a greater length produces a greater continuance (or a more rapid movement). . . . The discrimination of length in any one direction includes that of *extension* in any direction. Whether it be length, breadth, or height, the perception has precisely the same character. Hence superficial or solid dimensions, the size or magnitude of a solid object, come to be felt in a similar manner. It will be obvious that what is called *situation* or locality must come under the same head, as these are measured by distance taken along with direction.' . . . The sensation of muscular motion unimpeded constitutes our notion of empty space, and the sensation of muscular motion impeded constitutes that of filled space. Space is *room*,—room for movement; which its German name, *Raum*, distinctly confirms. . . . An intervening series of muscular sensations before the one object can be reached from the other, is the only peculiarity which distinguishes simultaneity in space [coexistence] from the simultaneity [in time only] which may exist between a taste and a colour, or a taste and a smell. . . . The notion of length in space, not being in our consciousness originally, is constructed by the mind's laws out of the notion of length in time."[1] He quotes, in support of this, the examination of a blind person, mentioned by Hamilton, *Lectures on Metaphysics*, vol. ii., ch. xxviii., which tended to show that "to those born blind, time serves instead of space; vicinity and distance mean in their mouths nothing more than the shorter or longer time which they find necessary to attain from some one feeling to another."

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[1] Mill, though he speaks of the "idea" and "notion" of space, is thinking of the *perception* of space.

The result of the theory is, that space is resolved into time. The blind have no perception of space, and "our idea of space is at bottom one of time."

Hence we said that such a method of explaining space-perception explains away its most characteristic features. If space consisted merely of distances and directions measured from the percipient by so much movement, Bain's analysis might hold; but the most characteristic features of space are summed up in the word "coexistence"; "simultaneity" refers only to time. A thing "in space" consists of *partes extra partes*, parts outside one another; sensations come to us not only with qualitative differences and time differences,—they come, as it were, laid out side by side.

If we look back at the terms used by Bain, we shall find he unconsciously *assumes* space. He speaks of the "sweep of a limb," the "extent or range of a movement." These terms imply space already, and unless we take them in a spatial sense they have no meaning. The very thought of a *series of muscular sensations—i.e.*, of *time* occupied, is involuntarily supplemented by the idea of a line—*i.e.*, of space; the words suggest to us the visual image of the space traversed or the tactual image of a line as feeling along a surface. But if we strictly confine our attention to muscular sensations alone, these do not coexist; they only follow one another in time, and coexistence cannot be got out of them.[1]

§ 10. *Extensity and local signs.*—Bain did excellent service in calling attention to the importance of muscular movement in *developing* our perception of space. It is perfectly true that the kinæsthetic sensations (ch. vii., § 2) afford a means of discriminating the range of a movement; but they cannot give space-perception unless there are some spatial data to start with,—some "primitive datum of space-consciousness" from which the developed perception of space could be evolved by the aid of movement.

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[1] This is now generally admitted. A similar line of criticism is applicable to Bain's view that all the space-perception of which the eye itself (unaided by associations with touch) is capable, is manufactured out of eye-movements (see § 12, below).

Before going on, we may dwell for a moment on this "discrimination of range." The recent discovery of the complexity of our sensations of movement has only strengthened Bain's position as to the reality of such discrimination. If the arm is bent first through four inches, and then through eight inches, the second movement gives rise to a longer and partly different series of motor sensations. The same applies to movements in different directions, whether or not one is longer than the other; the motor sensations are different. So they are in the case of movements differing in velocity. Bain says: "It is not meant to affirm that at each degree of shortening of a muscle, or each intermediate attitude of a limb, there is an impression made on the centres that can be distinguished from the impression of every other position or degree of shortening; it is enough to require that the range or amount of movement gone over should be a matter of distinct perception." This statement surrenders more than is necessary. It would seem that discriminative sensibility in the case of motor sensations can come very near to the pitch of accuracy of which Bain speaks,—particularly in the case of the blind. It is possible to distinguish the thicknesses of two pieces of paper by simply holding them, one after the other, between the finger and thumb, and noticing the minute difference in the position of the muscles in the two cases.

But what is the primitive datum of space-consciousness? This question would be unanswerable if there were not distinct traces of it to be discerned in our actual sensations.

It is now generally recognised that sensations of sight and touch, if not others, are characterised not only by quality, intensity, and duration (ch. xi., § 1); but that some at least of them have a characteristic which is rather one of quantity than quality, but of vague quantity. It has been called "extensity," "voluminousness," or "massiveness." Whether this belongs to all our sensations—as Professor James thinks—or only to some of them, is a point of minor importance for our present purpose. "We call the reverberations of a thunderstorm more voluminous than the squeaking of a slate-pencil; the entrance into a warm bath gives our skin a more massive feeling than the prick of a pin; a little neuralgic pain, fine as a cobweb, in the face seems less extensive than the heavy soreness of a boil or the vast discomfort of a colic or a lumbago."[1] Professor James goes on to quote from Hering some telling illustrations of the same characteristic in sensations of sight and touch. "Glowing iron looks luminous through and through, and so does a flame." A similar voluminous quality, says Hering, belongs to the darkness seen with closed eyes, or in a dark room with open eyes, or even in a dark corner of an otherwise well-lighted room; and to cutaneous feelings of temperature. By mapping out this *primitive sense of volume*—which certainly belongs to sensations of sight and touch—we get accurate local discrimination of positions outside each other. The sense of volume only contains the *possibility* of these distinctions; they lie potentially in it, but we are not aware of them till a later date when we have brought movement into play.

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[1] James, *Principles*, vol. ii. p. 135 (ch. xx.)

This process is aided by—and perhaps could not take place without—what are called *local signs*. These are so called "proleptically"; *i.e.*, because they furnish material for knowledge of locality, not because they are themselves local in character. A "local sign" is a minute difference attaching to a sensation according as it is connected with one part of the body rather than another. They certainly belong to touch and sight. Such differences are, however, very minute, and more a matter of theory than actual demonstration. Physiology supports the assumption that they really exist. Scarcely two points of the sensitive surface of the body are anatomically alike. Nerve-endings differ in different places; the parts differ also in the nature of the tissues underlying them. So a sensation received by one part would feel different from a sensation received by another part. The same holds good in the case of sight; with the addition that the colour-sense of the retina varies in different parts — being most intense in the "yellow spot" and decreasing towards the outer edge. These differences in colour-sensibility may serve as "local signs" which afterwards come to be interpreted in terms of space.

§ 11. *Co-operation of the three factors:* (1) *in touch.*—With the co-operation of these three factors—movement, extensity, and local signs—the development of space-perception becomes intelligible.

In considering the question we have to separate touch from sight, although these senses interact from the beginning in the development of perception.

Let us return to what was said about the perception of the body. Touch without movement—"passive touch," as it has been called—could give us no definite perception of positions even on the surface of our own body. It could give us only a sensation such as is felt when a postage-stamp is pasted on the hand. But if we take any given surface of the body and move the finger of the hand over it, we bring out into prominence the latent local signs. Passing our finger over it, we have (*a*) a series of muscular sensations, (*b*) a series of touches, each accompanied by these minute differences — each with its local sign. As these are all supposed to be located in the primitive sense of volume, or to have this aspect of intensity, we finally get the perception of a relative position of points—*i.e.*, of spatial coexistence. This accurate knowledge of detail is not given to start with. By thus exploring the surface of the body we get, as it were, a touch-map of the surface, in which differences come to be immediately interpreted by us in terms of space, and consequently we are able to localise in any part of the body automatically. We must emphasise the remark, already made, that the muscular movements involved in the various touches do themselves contribute to the definite spatial interpretation of the experience, since the feeling of "room to move in" is—not indeed the whole, as Mill and Bain thought, but—part of the perception of space. A particular succession of feelings of contact is accompanied by a particular succession of motor sensations. And since the touching part (as well as that which is touched) has its own tactual sensations and local signs, these give rise to feelings of double-contact (see § 7), which (when the body is touched by another object) greatly facilitate the perception of external filled space. But this last-named experience is developed and receives its most characteristic features through the active exploration (by touch) of external objects. By this means persons who have been born blind may develop a genuine spatial perception of the world.

Mill states that, to the blind, time serves instead of space. There is some plausibility in this statement in reference to great distances. The distance from one end of the room to the other is to us a visual image; to the blind man it means the time he would take to cross it, together with the muscular sensations of walking. This is still more true in reference to greater distances. We may therefore admit a certain amount of truth in Mill's statement as regards comparatively great distances. But the blind man, through exploring the surface of his body, has the opportunity not only of learning what coexistent points are—that is, what space means as different from time—but of forming a standard of measurement for other bodies. He perceives whether an object is smaller or larger than the hand he lays on it, and perceives both as extended. And active exploration of it by touch provides him with numerous feelings of surface, distance, and direction round the object,—including feelings of the greater or less amount of movement involved in the attainment of these tactual experiences (on the discriminative sensibility by means of motor sensations, see § 10, p. 342).

What has been said of the blind percipient applies, of course, also to the seeing percipient, with the difference that the latter has not to rely on motor and tactual experiences alone.

§ 12. *Co-operation of the three factors:* (2) *in sight.*—

In the next place we must ask, What can the *eye* attain to in the way of space-perception by itself? We start (as before) with a primitive sense of volume and latent retinal local signs.

Movement is here an inseparable factor, because the eye is in constant motion; but for purposes of theoretical inquiry we must disregard it and ask, How much spatial perception could be had by an eye perfectly at rest?[1] By this we mean an eye which can neither have the curvature of its lenses modified nor the direction of its axis changed. The extreme view described in the latter part of § 9 above may be summed up in Bain's words: "In the last resort, linear, superficial, and solid extension are to us nothing but the consciousness of continued and complicated movements, which we can associate in different groups, and remember among our intellectual acquisitions."[2] The adherents of this view have wavered in their answers to the question stated above. Thus, Bain says that the eye itself can feel only Colour, which, as thus felt, is "simply a mental effect or influence, a feeling or conscious state, which we should be able to distinguish from other conscious states, as, for example, a smell or a sound; we should also be able to mark the difference between it and others of the same kind, more or less vivid, more or less enduring, more or less voluminous; so we should distinguish the qualitative differences between one colour and another." How much extension is implied in this? There is no doubt that an accurate knowledge of the field of vision is due to eye-movements; but it does not follow that the eye in itself has no perception of extension. If it can as much as distinguish two colours or shades of colour at once, the boundary which separates the colours must give some specific affection of sight. Mill says that the motionless eye could have a full and clear vision of but a small portion of space and only a faint one of other points surrounding it. Bain says that it would be able to take in a space of about one-tenth of an inch in diameter. But the *precise size* of what can be seen by the eye at rest is irrelevant. A rudimentary perception of extension in such a case is practically admitted,—the perception of a certain expanse or field, not merely of something like a mathematical point.

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[1] Strictly speaking, this question (for a reason that will appear below) should take the form, How much space-perception could be had by an eye *that had never* moved?

[2] Bain, *Mental and Moral Science*, p. 26. The reader will now see that, in our view, the fundamental error in this statement lies in the words "nothing but."

The contention that the eye itself has no direct perception of *depth* (the third dimension) has been more generally accepted. Professor Baldwin and others lay it down with definiteness that what the eye perceives is a surface and not any depth or distance. Here again we must complain of vagueness of statement. Is it meant that if a man, born blind, received his sight, his new perceptions would seem "in his mind" as his emotions (for instance) are? This would seem to be an idle speculation, utterly unconfirmed by the results of successful operations on the eyes of the blind. These results show indeed, that the visual perception of objects at definite distances must be *acquired;* but though, in cases of successful operation, distances seen may be all at first in confusion and things may seem "close up to the eye," this does not prove what is required. The *precise extent* of the depth or distance seen is irrelevant; the new sensations are not "in the mind" but are qualified by a rudimentary perception of "outness." The new perceptions, we may add, would not in any case be of an absolutely flat surface; the rudimentary feeling of expanse and depth could form a misty vagueness, in which the relative distances of things would not yet be discerned.

Our conclusion is that just as we cannot build up space in two dimensions out of unextended sensations of colour, so we cannot confer on the eye the perception of space in three dimensions unless optical sensations are vaguely felt from the outset as voluminous, roomy, or space-filling. This is what we have called "extensity" (§ 10).

How do the movements of the eye help to map out this sense of volume into distinct positions? These movements concern the axes of the eyes (when the two eyes converge, diverge, and sweep over the field) and the crystalline lens (which relaxes, or the reverse, to accommodate the eye to more distant or nearer objects, see ch. xi., § 7, ii, iii). Professor James quotes from an able physiological work—Martin's *Human Body*—the following account of the perception of distance and of size.[1] "With *one* eye, our perception of distance is very imperfect, as illustrated by the common trick of holding a ring suspended by a string in front of a person's face, and telling him to shut one eye and pass a rod from one side through the ring. If a penholder be held erect before one eye, while the other is closed, and an attempt be made to touch it with a finger moved across towards it, an error will nearly always be made. In such cases we get the only clue from the amount of effort needed to 'accommodate' the eye to see the object distinctly. When we use both eyes our perception of distance is much better; when we look at an object with two eyes the visual axes are converged on it, and the nearer the object the greater the convergence. We have [by experience] a pretty accurate knowledge of the degree of muscular effort required to converge the eyes on all tolerably near points. When objects are farther off, their apparent size, and the modifications which their retinal images experience by aerial perspective, come in to help. The relative distance of objects is easiest determined by moving the eyes; all stationary objects then appear displaced in the opposite direction (as, for example, when we look out of the window of a railway car), and those nearest most rapidly; from the different apparent rates of movement we can tell which are farther and which nearer. [Such eye-movements, of course, bring about movements of the retinal image, which bring out the latent retinal local signs, as the image passes to and from the "yellow spot."] . . . The dimensions of the retinal image determine primarily the sensations on which conclusions as to size are based. The larger the visual angle, the larger the retinal image; and since the visual angle depends on the distance of an object, the correct perception of size depends largely on a correct estimate of distance; having formed a judgment, conscious or unconscious, as to that, we conclude as to size from the extent of the retinal region affected. Most people have been surprised now and then to find that what appeared a large bird in the clouds was only a small insect close to the eye; the large apparent size being due to the previous incorrect judgment as to the distance of the object. The presence of an object of tolerably well-known height also assists in forming conceptions (by comparison) as to size; artists for this purpose frequently introduce human figures to assist in giving an idea of the size of other objects represented."

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[1] James, *Text-book of Psychology*, pp. 39, 40.

§ 13. *Co-operation of sight and touch.* — A space-world, of a sort, could be built up by movement and touch (including tactual signs) alone, or by movement and sight (including retinal local signs) alone; but our actual space-perception arises from the *association between sight and touch.* From our first entrance into the world we have been learning the connection, so that at length a sight-perception becomes an indication of possible touch-perceptions. Movements of the limbs, whether impeded or not, are visible, and therefore provide associations of sight and motor sensations. All the tactual exploring movements referred to above (§ 11) are accompanied by sight sensations of the contact (the hand and the bodily organism, or the hand and the outer object); and it is only a matter of time, with sufficiently *numerous* and *varied* instances of the conjunction of the two kinds of experience, for a visual perception at once to suggest a touch perception, which is not actually perceived but represented in idea. When, therefore, we see a solid object, or a smooth surface, our visual perception is complicated with suggestions of active touch. When we see an object at a certain distance and direction, part of our visual perception is given by suggestions of movement required to reach it; and so on. These suggestions of active touch, contained in sight sensations, are not necessarily free ideas of memory; they are usually dependent on the sight-sensation, in the manner described above (§ 3, p. 324); they are so closely bound up with the sight-sensation, that we have the (incorrect) impression that we see distance and direction directly and immediately.

We must repeat and emphasise the observation that all the factors of perception develop together in close interaction; the perception of reality through motor adaptation (§ 6), the perception of the body (§ 7), the perception of objects outside the body (§ 8), the perception of extension through active touch (§ 11) and active vision (§ 12), are co-operating functions, separated only for purposes of theoretical analysis.

§ 14. *Perception of time.*—Our *idea* of time is that of a series of events, succeeding one another, capable of being divided into present, future, and past; the series extends back indefinitely into the past and forward indefinitely into the future. It is clear that at the merely perceptual level, no such idea could be formed; but it does not follow that there is no immediate perception or experience—or, as we might even say, feeling—of duration and succession.

Even at the level of mere discernment (§ 2), an impression, lasting unchanged for a certain time, could produce by its continuance a gradually cumulative effect in consciousness,—for the discernment of it at any moment is affected by traces of its discernment at previous moments, so that the feeling of it is different as time goes on; a succession of impressions, connected together by their relation to the same impulse (see p. 320), will produce a similar gradually cumulative effect. The accumulation of effects varies according to the time taken up by the process. Thus even a mere impulse or a bodily feeling is felt differently according as its duration varies. The time during which it is actually being felt, the time marked by the actual occurrence of sensation and feeling, is what is meant by *the present*. Hence "the present" time is never a mathematical point or indivisible instant; it is "a sort of saddle-back of time with a certain length of its own." Professor Stout points out that it is longer or shorter according to circumstances; "on the perceptual level it is longer when conation is obstructed or delayed, and shorter when conation proceeds successfully and easily to the attainment of its end."

A creature capable only of "Discernment" might experience time thus in the present, but in the present only; it could have no memory or expectation.

At the higher level of simple Recognition, the germ of the conscious distinction between present and past appears. The feeling of familiarity takes us beyond the present; and the complication of a present perception with vague representations of past perceptions (§ 2, p. 323) goes further in the same direction. At this level there is indeed no distinct contrast and comparison of the present time with other times; but there is a vague consciousness of the difference resting on the actual transition between a perception and a memory-image. Consideration of this subject is continued below (ch. xiii., § 10).

The main points to grasp are: (1) the meaning of *the present* (as a psychological fact, not a mathematical abstraction); (2) the fact that a present conative process (even if it is only an animal impulse) has sufficient unity of its own to give rise (through the operation of retentiveness, simply by its continuance in time) to a feeling of continuous transition; (3) that this is the most primitive experience of time, and that further development of the time-consciousness depends on ideation, and begins with the vague apprehension of a transition between the feeling and perception of the present, and the memory-images with which these are complicated.

The psychology of time is very obscure, and little light can as yet be thrown on many of the details. In this place we give the following references: Stout,* *Manual*, bk. iii.

(ii.), ch. vi.; bk. iv., ch. vi., § 4, ch. vii.; James,* *Text-book*, ch. xvii.; Sully, *Human Mind*, vol. i., ch. viii., § 30, ch. ix., §§ 20-25; James, *Principles*, vol. i., ch. xv.; and article "Time-sense" in Baldwin's *Dictionary*.

The Psychology of Perception is one of the most difficult parts of the subject; but the student who has grasped the main idea of the dependence of perception on conation (on the active side of mental life as distinguished from the passive or mechanical) has gone far towards surmounting the difficulties. This idea is admirably expounded by Professor Stout, *Manual*,* bk. iii., *Groundwork*,* ch. ix., and *Analytic Psychology*, vol. ii., ch. v., xi. Sully's treatment of Perception, *Human Mind*, vol. i., ch. viii., suffers from vagueness in certain respects, but gives a very careful and complete survey of the ground. Ward, article "Psychology," pp. 51-56, gives a clear summary of all the essential points. Other important references, for the English reader, are: James, *Principles*, vol. ii., ch. xix. (Perception of "Things"), and ch. xx. (Perception of Space,—the most important recent treatment of the subject: for a brief statement see his *Text-book*, ch. xxi.); Bain, *Senses and Intellect*, under headings "Muscular Sense," "Sight," "Touch," and "External Perception"; Mill, *Examination of Hamilton's Philosophy*, ch. xiii. (Space-perception); articles "Perception," "Extension," and "Local Sign," in Baldwin's *Dictionary;* Ward, articles on "Assimilation and Association" in *Mind*, July 1893 and October 1894 (two noteworthy articles, the second and more important of which has been quoted in the foregoing chapter).

A very interesting illustration of the acquirement of coordination between spatial perception by sight and by touch is given by Mr G. M. Stratton (*Psychological Review*, vol. iii., No. 6, vol. iv., Nos. 4, 5), who wore glasses so constructed that the retinal images of external objects were *not inverted*, and succeeded in harmonising sight and touch (through movements and local signs) under these totally new circumstances.

The reader of German is referred to three important articles by Heller, *Philosophische Studien*, vol. xi. (1895), Nos. 2, 3, and 4, entitled *Studien zur Blindenpsychologie;*

and to an article by Uhthoff in the *Zeitschrift für Psychologie u. Physiologie d. Sinnesorgane*, vol. xiv., Nos. 3, 4, dealing with cases of successful operation on persons born blind. A recent case is described by Latta, "A Case of Successful Operation for Congenital Cataract in an Adult," *British Journal of Psychology*, vol. i., pt. 2, pp. 135ff (July 1899). Older cases are described by Hamilton, *Lectures on Metaphysics*, vol. ii., ch. xxviii., and Abbott, *Sight and Touch* (1861): the most important are those of Cheselden (1728), Franz (1840), and Nunnely (1858).

CHAPTER XIII.

MEMORY.

§ 1. *Factors in memory.*—There are times when, from the multitudinous faces and figures which meet us in our daily walk, we select one and annotate it thus: "I have seen you before." We may not be able to say when or where or in what circumstances, but the sense of familiarity which accompanies the percept is a perfectly definite experience. It seems to consist in a kind of tingling which makes us feel that this particular percept has associations in our mind which might be awakened if we could only hit on the right means. We dwell on the percept, trying to strengthen it; we run over it, point by point, like a mouse in a cage trying to find an outlet; we bring up other ideas, such as those of hotels we have stayed at, societies we belong to, journeys we have made, to see if any will act as key to the puzzle. At last the spark passes, the junction is made, we exclaim, "I know; it is Mrs King, I met her in Florence; she and her husband went with us to Vallombrosa!" a host of other details springs up, a whole week or year of our lives seems to swing through our minds in a few short moments.

An analysis of this or any similar example will show that a complete act of memory involves four factors:—

a. Retention or Conservation of Presentations.

b. Their Reproduction.

c. Their Recognition as belonging to my previous experience.

d. Their Localisation in that experience.

Retention and Reproduction are both dependent on what James has called the elementary law of habit in the nerve centres—*i.e.*, that these centres are so constituted that when any cerebral process takes place, they are so modified that the same process is liable to recur. It is as if a track were formed which directs future discharges of energy. We do not know exactly what change takes place in the brain when an act, say of perception, is accomplished; hence all that we mean by Retention is this liability to recur;[1] when the recurrence actually does take place we have reproduction. The power is one which differs greatly in different individuals, and is not necessarily associated with mental grasp. Idiots frequently possess it in remarkable degree. Thus Forbes Winslow tells of an idiot who "could remember the day when every person had been buried in the parish for thirty-five years, and could repeat with unvarying accuracy the name and age of the deceased and the mourners at the funeral."

Native retentiveness must be tested by desultory memory—our memory for things which have not a special interest or importance for us. Professor James gives an instance of a friend of his own who "was introduced to a certain colonel at a club. The conversation fell upon the signs of age in man. The colonel challenged him to estimate his age. He looked at him and gave the exact day of his birth, to the wonder of all. But the secret of this accuracy was that, having picked up some days previously an Army register, he had idly turned over its list of names, with dates of birth, graduation, promotions, &c., attached, and when the colonel's name was mentioned to him at the club, these figures, on which he had not bestowed a moment's thought, involuntarily surged up in his mind."[1]

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[1] How much is here meant by the word "recur" is doubtful; it certainly does not mean that in reproduction the whole nervous process recurs exactly as it occurred in perception. For discussion of the question see ch. xiv., § 5, pp. 412 ff.

This tendency to repetition in the nervous system has been likened to the law of inertia in the material world. The fundamental law of physics is that motion once initiated continues; and at first sight the law of habit seems so analogous to this, that to some philosophers the difficulty has been to account for forgetfulness, not for memory. Enough instances of wonderful recoveries of memory have been recorded to make the hypothesis that we really never forget tenable. Thus De Quincey tells us that in his opium dreams "the minutest incidents of childhood or forgotten scenes of later years were often revived. I could not be said to recollect them; for if I had been told of them when waking, I should not have been able to acknowledge them as parts of my past experience. But, placed as they were before me, in dreams like intuitions, and clothed in all their evanescent circumstances and accompanying feelings, I recognised them instantaneously." Indeed, we all know only too well that we cannot always command our knowledge; we are often aware that a certain name or phrase is really in our memory, although we cannot produce it at the moment.

But the analogy on which the theory is based does not really exist. For while changelessness rules in the inorganic, the principle expressed throughout the organic world, as we know it, is that of growth or development, and decay; of birth and death. The opinion of ordinary experience that memories lapse through time is probably correct. The liability of the neural change to recur becomes less and less as time passes on, until possibly the nervous elements settle down almost to their original state.

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[1] James, *Principles of Psychology*, vol. i. p. 661.

We must not think of memory as storing up an infinite number of separate ideas, or even of complete experiences. Each hour of our life has an influence on us and alters us, but for this causal action it is not necessary that any particular perception should survive in its individual distinctness. What we have are rather *functions* or *modes of action* which may occur in the most various combinations; definite facts or incidents are remembered, and definite images persist only so far as they continue to supply us with the working material of an intellectual life—*i.e.*, only so far as we continue to use them in fresh combinations.

That the physical substratum of retention is extraordinarily complex has been demonstrated by the study of various amnesias or forgettings. Thus a man may forget all words beginning with some special letter; he may forget how to write words and remember how to speak them. He may forget his own name. These amnesias are associated with more or less definitely localised cerebral disorders, and they show to what a degree specialism prevails in the brain regarded as the organ of memory.

Our knowledge of any object—of an apple, for instance—seems to us a unity, but in reality it is made up of sight memories, smell memories, taste memories, touch memories; and if any of these branches of memory were destroyed then our concept would be so much the poorer. Thus each of the sensory centres possesses its own memory, and it is matter of common knowledge that in the same individual these memories may vary much, both in tenacity and vividness. Thus we may have a good memory for sights and a bad one for sounds; a good colour memory and a bad one for form; a good memory for figures and a bad one for names. In this region individual differences are great, as Mr Galton has shown; but almost invariably the visual and auditory memories are stronger than those of the other senses.

§ 2. *Conditions of retention.*—Whether the different parts of the cortex differ originally in their power of retention, or whether the apparent difference arises in the course of education, we cannot yet determine. Professor James regards the power of retention as inherent in the brain, and considers that it cannot be modified by education. Improvements in memory he holds are due not to any change in the native power of retention, but to improvements in method. Thus an actor may learn his part more quickly in age than youth, but this is because he has found out by experience the best way to impress it upon his mind. A linguist learns each successive language more easily than the first, but this is because his plan of campaign being settled he wastes no time at the beginning; and moreover, he has in his mind much which, by its resemblance to the new knowledge, makes the process of acquisition easier by actually lessening the bulk of the new.

The power of retention varies with the state of the brain. Fatigue is unfavourable to it. Professor Mosso tells us that Alpine climbers have frequently to take notes during their great ascents, as after their task is over they can remember nothing.[1] Sir Richard Burton, the great Eastern linguist, says that in learning a new language he "never worked more than a quarter of an hour at a time, for after that the brain lost its freshness." A friend of our own, a professional elocutionist, tells us that all pieces she has committed to memory when in good health and not fatigued she can reproduce at any moment; but such pieces as have originally been learned when she was tired or run down have to be relearned every time she has occasion to use them.

Retention varies also with the amount of attention we bestow on the original experience. Hence the laws of retention are for the most part identical with those of attention. Thus when any circumstance interests us intensely, it impresses itself quickly and deeply. Browning's "Fra Lippo Lippi" furnishes us with a good example when he explains his gift for life-like portraiture thus :—

> "But, mind you, when a boy starves in the streets
> Eight years together as my fortune was,
> Watching folk's faces to know who will fling
> The bit of half-stripped grape-bunch he desires,
> And who will curse and kick him for his pains,—
> Which gentleman processional and fine,
> Holding a candle to the sacrament
> Will wink and let him lift a plate and catch
> The droppings of the wax to sell again,
> Or holloa for the Eight and have him whipped,—
> How say I ?—nay, which dog bites, which lets drop
> His bone from the heap of offal in the street,—
> Why soul and sense of him grow sharp alike,
> He learns the look of things, and none the less
> For admonition from the hunger-pinch."

The more massive an experience is—that is, the more it affects our whole personality—the more likely it is to be retained. In such a case the memories of the different senses come to the aid of each other. Moreover, what is even more important, such an experience is sure to be soon and frequently reproduced, and each reproduction deepens the original impression, and adds to the chance of the memory reappearing in consciousness.

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[1] Mosso, *Fatigue*, Eng. trans., p. 200.

When we *commit* anything *to memory* we usually do so by means of repetition. This may be merely a device for increasing the duration in consciousness of the presentations in question, and so deepening the "traces." This process of "deepening" seems to go on even in subconsciousness, so that a pause between successive repetitions or groups of repetition is advantageous. In a series of experiments conducted by Jost,[1] it was found on comparing eight repetitions on each of three successive days with four repetitions on six, and two on twelve, that the efficiencies tested twenty-four hours later were respectively as 11.5, 35, and 54. The experimenter surmises that one repetition on each of twenty-four successive days would give better results still. Here the total number of repetitions is in every case the same; the difference is only in the number of times that what may be called the process of "settling" is allowed to take place—namely, three, six, and twelve times. It is as if the effort to learn generated a certain momentum which causes the mind to go on growing in the same direction even when explicit attention is withdrawn. An analogous state of affairs is well known to exist with respect to our muscular accomplishments. Professor James has somewhere said that we learn to skate in summer and to swim in winter: this simply means that the skill precariously attained during the season's practice becomes settled and confirmed during the subsequent rest.

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[1] See Ward, *Ency. Brit.*, vol. xxxii. p. 62.

If now we tabulate the conditions favourable to retention we find they are as follows:—

1. Freshness of brain (or mind).
2. Amount of attention bestowed on the experience.
3. Massiveness of the experience.
4. Number of times the experience is repeated, or its duration in consciousness.

§ 3. *Experimental work.*—Of late years a great deal of experimental work has been done with a view to finding out more exactly the laws of retention; and as this appears to us to be amongst the most promising fields of investigation in experimental psychology, we shall attempt to give shortly some idea of the ends in view, the methods used, and the results attained.

It is abundantly plain that memory as it occurs in ordinary life is a very complex phenomenon: whether an experience will be retained in memory or not depends often upon the whole previous life-history of the individual concerned. There are certain events, such as births, marriages, deaths, which, trivial to others, rouse in us such hosts of associated thoughts that we could never forget them. The first endeavour of the experimentalists is then to simplify the problem. With this end in view they select material which has few associations: Ebbinghaus, the pioneer in this research, used nonsense-syllables such as nem, pep, taw, &c.; since then musical tones, figures, coloured squares, rays of light of different intensities, have been among the materials employed. Among the aims of the inquirers have been to find out the effects of rhythm, repetition, primacy, recency of the impressions on the memory;

to discover the comparative strengths of the different sense memories; to compare immediate reproduction with reproduction after an interval; to ascertain how the different senses affect one another when used in conjunction, and so on. The following account will serve as an example of the methods used. This investigation was undertaken by Münsterberg at Harvard; the material used was small squares of different colours and similar white squares with black numbers printed on them. These squares were exposed in series of twenty, two seconds being given to each. The subjects were given similar squares and requested to arrange them in the same order as those they had seen. They were cautioned against making associations. The reproduction was immediate. It was found that in the purely visible series the average error was 20.5 per cent; in the audible series, where the colours or numbers were named instead of being shown, the average error rose to 31.6 per cent; when the series was mixed, the material being sometimes shown and sometimes named, the error increased to 39.3 per cent. It would thus seem that to change from one sense to another has a harmful effect upon the memory. When the two senses of sight and hearing are used in conjunction the errors are to those of a purely visible series as 3.9 is to 10.5. Thus the different senses aid one another very considerably when used together.

A great mass of material is being in this way accumulated, from which it may be expected that valuable results will in course of time emerge. A few references to this literature are appended: F. Kennedy, "The Experimental Investigation of Memory," *Psych. Rev.*, vol. v. p. 477 (an examination of the methods and problems, with a useful bibliography); W. G. Smith, "The Place of Repetition in Memory," *Psych. Rev.*, vol. iii. p. 21; L. G. Whitehead, "A Study of Visual and Aural Memory Processes," *Psych. Rev.*, vol. iii. p. 258; W. H. Winch, "Immediate Memory in School Children," *Brit. Journ. of Psych.*, vol. i. p. 127, vol. ii. p. 52; James, *Principles of Psych.*, vol. i. pp. 676-679 (an account of the inauguration by Ebbinghaus of these experimental investigations; cf. also Ward, suppl. art. "Psychology," *Ency. Brit.*, vol. xxxii. pp. 61, 62); M. W. Calkins, "Association," *Psych. Rev.*, vol. i. p. 476, vol. ii. p. 32; E. A. Kirkpatrick, "An Experimental Study of Memory," *Psych. Rev.*, vol. i. p. 602; M. W. Calkins, "Short Studies in Memory and Association from the Wellesley College Psychological Laboratory," *Psych. Rev.*, vol. v. p. 451; E. A. Kirkpatrick, "Memory and Association," *Psych. Rev.*, vol. v. p. 654. These last three papers form a connected group showing results of very considerable educational suggestiveness. In Dr Burnham's valuable monograph on Memory in the *American Journal of Psychology*, vols. i. and ii., a section is devoted to experimental studies, vol. ii. p. 587.

In the course of his investigations Ebbinghaus showed that the process of forgetting is rapid at first, but falls to a minimum later. Measuring the amount forgotten by the time required to re-learn the series, he found that although half was gone after one hour, eight hours later only two-thirds had disappeared, while later still considerable stretches of time passed in which hardly any decrease could be detected. The swiftness with which forgetting proceeds at first is recognised by our common law, which accepts as evidence such notes as are written down on the spot, but not such as are made immediately after the witness has returned home. Travellers have noted the same thing: thus Dr Johnson in his 'Journey to the Western Isles' says: "An observer deeply impressed by any remarkable spectacle does not suppose that the traces will soon vanish from his mind, and having commonly no great convenience for writing, defers the description to a time of more leisure and better accommodation. He who has not made the experiment or is not accustomed to require rigorous accuracy from himself, will scarcely believe how much a few hours take from certainty of knowledge and distinctness of imagery; how the succession of objects will be broken, how separate parts will be confused, and how many practical features and discriminations will be found compressed and conglobated into one gross and general idea." This may be one reason why the expression "travellers' tales" has become a byword.

§ 4. *Reproduction: laws of association.* — The existence of retention as a quality of mind or brain is not known directly, it is only deduced from the fact of Reproduction.[1] We have seen that a certain degree of retention is indeed involved in all psychic life; it would be impossible to understand a spoken sentence unless the beginning were still echoing in your mind when the final words are pronounced: similarly, all comparison, judgment, even ordinary perception, evidently involve memory (ch. xii., §§ 3, 4). Thus the "present" time to the human mind is not a mere mathematical point as we conceive when we think of time in the abstract, but is a period of sensible duration including all the experience grasped in one act of attention and feeling. Reproduction proper, however, means the repetition of some presentation after an interval during which that particular presentation has not existed for consciousness at all. Language is apt to be misleading here because we talk of the recurring or repeated presentation as being the "same" as the original one, whereas what we really mean is that the two presentations, which as psychic events are two distinct entities, refer to one and the same object. Thus if you form a memory picture of Ben Nevis as seen from Fort William to-day and also to-morrow, you say you have the same idea both times; your meaning, however, is that you have had two mental pictures, both of which referred to or represented the same object—Ben Nevis. Neglect of this simple and obvious point has caused much confusion in psychology. It may be contended that the cerebral modifications in the two cases are the same, in the sense of being indistinguishable without a reference to time—that is, as first or second. This is very doubtful. The clearest of memory images is continually shifting, as we lay stress first on one part then on another, and it is unlikely that our thoughts, and with them the cerebral changes, should follow exactly the same course twice. Speaking generally, however, we may allow that especially in the simplest cases, as when we image a straight line or remember a proposition of Euclid, the brain changes keep pretty closely to certain established lines.

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[1] Cf. what was said above (ch. iii., § 5) concerning "psychological dispositions."

Apart from such memory images as we have hitherto had in view, there are certain elementary forms of reproduction which have sufficient psychological interest to be considered here. If we open our eyes upon a bright light and immediately close them again we see a white image of the light forming itself upon the field of darkness. This persists for a short time, then disappears, after which it may reappear and again disappear possibly more than once. Then, if the observer still keeps his eyes closed, a dark image of the light may appear and may go through the same fluctuations. The first image has been fitly called an after-sensation, or perhaps more correctly an after-percept; the second is the well known complementary image. Again, if we have looked long and intently at any object (*e.g.*, the field of the microscope) a vivid representation of it is apt to recur involuntarily even when our thoughts have no reference to it. This has been called the primary memory image. It does not move with the movement of the eyes as the after-sensation does (ch. xi., § 7, vi.), and is not generally so definitely localised in external space. It is, in fact, a true memory image, deserving to be placed in a class by itself only because of its vividness and persistence. In course of time it fades so as to be indistinguishable from the ordinary memory image.

Ordinary reproduction, after an interval, takes place in accordance with the Law of Similarity or the Law of Contiguity. The law of Similarity is that the occurrence of any state of mind which resembles a past state tends to bring about a recurrence of that past state. Thus, if we are angry with any one, all the previous injuries he has done us are apt to rise in our minds. Now it is evident that the thought of the present injury can never before have been associated with the thought of any of the other injuries; hence it is at first sight difficult to explain this Law of Similarity in accordance with the known laws of cerebral action. But when we analyse the state we perceive that part of it is *identical* with previous states: in this case the general sense of injury and the thought of the special person guilty have occurred before, and have then been associated with other circumstances, which are now raised by them to consciousness. To look at the matter from the physical side,—a portion of the brain tracts which are now excited has in former states of excitation made part of other definite paths; the present excitement tends to pass along the same paths, and simultaneously with this the memory of the previous associates rises in consciousness. Thus the Law of Similarity turns out to be simply the psychical side of the law of neural habit.

The Law of Contiguity states that when two elements of experience have once been connected by occurring simultaneously or in close succession in consciousness, then the recurrence of the one tends to bring about the recurrence of the other. This statement must not of course be interpreted as meaning that a bond of union is established between *any* two presentations which occur together in consciousness. Generally speaking, it is only when they have been attended to together that they become connected. Occurrences which have not interested us are dropped out. Did the whole state tend to recur, memory instead of being an abstract of experience would become a transcript, and would lose much of its practical usefulness.

If we now compare the analysis of the law of similarity with the statement of that of contiguity, it will appear that the two do not really differ, the revival of similars by similars being in its essence a revival of ideal elements by ideal elements which were once actually associated with them in consciousness. It has been, therefore, proposed to combine these two generalisations into one single law, to be called the law of Redintegration, the purport of which would be that the whole of a mental state tends to be reconstituted when any part of it occurs. The distinction between the two laws, however, though quantitative rather than generic,—the identical element in the two states being obviously much smaller in the case of revival by similars than in the case of revival by contiguity,—is not without its practical use. Thus all analogy, all scientific generalisations, are instances of the action of the law of similarity; all causal connections, of that of contiguity. Our memory of our past lives depends mainly on associations of contiguity, our forecasts of the future on suggestions by similarity. The more mobile a mind is, the more does its action exemplify the law of similarity; hence children have long been noted for their sensibility to suggestion by similars. Apart from mobility, a fineness of organisation would favour this kind of mental movement, as the elements of the mental states would then be more clearly discriminated. Such a mind will be original, for there seems no end to the similarities that may be discovered if we have only wit enough to perceive them.

§ 5. *Effects of emotion and interest.*—The reinstatement of a previous state is usually gradual, one element summoning up others. Thus re-reading an old letter will wake to life many thoughts and emotions long unfelt. A whole emotional attitude may be thus reinstalled. When an "old boy" revisits his school, the sight of the buildings, the familiar rooms, the well-known face of his old master, sometimes bring back to him in tingling reality the shrinking timidity of his youth: on the other hand, the changes may be so many that by their constant hostility to the process they prevent reinstatement; or, the old self of boyhood may have been left so far behind that, though there is an intellectual memory of the old conditions, it fails altogether to possess consciousness and drive later elements from the field. Hotspur's famous speech descriptive of the trimly dressed lord with his complaint of the soldiers who bring "a slovenly unhandsome corse between the wind and his nobility," is an excellent example of this reinstatement of a previous state of mind. As his anger again rises at the very thought, every little incident of the conversation comes back to him—though, conveniently enough, fatigue, as he points out, has swept from his remembrance his own share in it.

That this law of reproduction includes emotion among the elements of experience is a fact that is often neglected. And yet emotion is a determining factor of the utmost importance in the movement of experience, for there is a massiveness about it which renders its influence greater than that of almost any of the ideational elements. Each of the latter, moreover, has hundreds of associates, and which of these is brought into consciousness is determined largely by the dominant feeling or mood of the moment. When we are gloomy the stream of thought is darkly tinged, when we are glad it dances in the sunlight.

Again, the dominant interest determines the direction of the flow towards itself. The thoughts which the same landscape arouses in a geologist and in an artist are entirely different.

We have seen that the number of representations or reproductions of a presentation, the recency of its occurrence, its original interest, the length of time during which it occupied the focus of consciousness, are all factors favouring retention. If we talk over and think over our experience we shall have "better memories" than if we live simply in the present, letting each day's life slip from us as the sun goes down. We all know that it is possible to acquire very quickly and thoroughly a considerable body of knowledge—*e.g.*, for an examination or for some legal case—and then to drop this from our mind so completely that a week or a fortnight after there may be the merest fragments remaining. It is quite otherwise with knowledge in which we have a permanent interest, for we are constantly reviving this either to use it or to add to it, and each reproduction gives it a new lease of life. Knowledge in this way often becomes so strengthened that it rises in our minds spontaneously even when we are otherwise occupied; it establishes itself as a neural habit, thus lending countenance to the Herbartian scheme of presentations which in that limbo below the "threshold" are engaged in ceaseless struggle to rise to the clear light of consciousness.

It has been doubted whether ideas ever do rise thus spontaneously, the suggestion being that there is always some "cue" either in perception or in the preceding thought to bring them up; and indeed we may admit that, apart from the influence of sensations, the direction of our active consciousness seems in most cases to be determined by associations. But even if this were the case universally, the statement must not be interpreted as implying that the mind is passive; on the contrary, as we have just seen, the dominant interest of the mind at the moment determines the particular course of the thought among many possible ones, as when the "swish" of any feminine skirt rouses in Romeo the image of his Juliet—not of his landlady. We ourselves believe, as indicated above, that not only do certain thoughts appear in consciousness on the merest pretence of a cue, but that the slightest pause in the stream of thought acts like the release of a catch which is suppressing these insistent ideas. They surge up in our minds whenever these are temporarily vacant,—*e.g.*, after sleep—we have noticed this occur before our eyes were open,—or when we sit down to rest prepared to "think of nothing." The reader should examine this point in the light of his own experience. In pathological cases the common "mania of suspicion"—the conviction that one is being plotted against by every one—is a similar example of the hyper-excitation of a psychical disposition causing certain ideas to rise in consciousness without cue.

While the habit of "rubbing one's thoughts together" in idle moments certainly strengthens the bonds of association and increases the chances of reproduction, it tends at the same time to render the mind homogeneous—*i.e.*, to equalise the chances of the principal items of our experience recurring to consciousness. The associations formed by items not worked over appear to be very much stronger, but this is often simply because they are fewer. The sense of smell is often referred to as possessed of extraordinarily strong associative power: with many people a particular scent always calls up a particular condition of mind. Thompson Seton asserts that this is the secret of the Indian medicine-bag; many of the Indians "in time find out the smell that conjures up their happiest hours and keep it by them. . . . It is very real and dear to them—that handful of pine-needles, that lump of rat-musk, or that piece of spruce-gum. It adds the crown of happy memories to their reveries." Now smells are by most people not easily reproduced in memory; for this and for other obvious reasons they are not constantly turned over and over in consciousness and so brought into a network of interconnections as visual images are; hence if a particular smell forms a part of a total state of consciousness which makes a deep impression, the recurrence of the smell sensation will recall that one state and no other.

§ 6. *Types of memory.*—We have already pointed out that each of the senses has its own memory, and that these memories differ very much in vividness.[1] Mr Galton in the course of his researches has demonstrated that some individuals habitually use one sense memory, some another. He distinguishes a visual, an auditory, and a motor type. The memory for tastes and smells also differs in different individuals, though from the nature of the information we obtain from these senses it is unlikely that there exists an olfactory or a gustatory type. M. Ribot adds to the three above mentioned an affective type, representing a class of persons whose memory for emotional experience is unusually vivid. To illustrate what is meant, I quote a short example from his book, *The Psychology of the Emotions*, p. 155.

Case 6: a woman aged 28. "Three years ago I used to go and see a relative who was undergoing treatment at an establishment in the neighbourhood of P——. My visits were very frequent, and always began with a long wait in a room overlooking the garden. If I wish to repeat the impressions of this time of waiting, which was always disagreeable to me, all I have to do is to sit down in a chair, as I was then seated, to close my eyes and put myself in the same frame of mind, which I can do quite easily. Not half a minute passes between the evocation and the clear and absolute reconstruction of the scene. First I feel the carpet under my feet, then I *see* its pattern of red and brown roses; then the table with the books lying on it, their colour and style of binding; then the windows, and through them the branches of the trees, of which I hear the sound as they beat against the glass; lastly, the peculiar atmosphere of the room, its unmistakable smell. After this I feel over again all the weariness of waiting, complicated by an intense dread of the doctor's arrival—a state of apprehension ending in a violent palpitation of the heart which I find it impossible to escape. When once I have entered on this train of thought, I have to follow it out to the end, passing through the whole series of states which I passed through at the time."

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[1] For examples of the degrees of vividness in images, see under Imagination, ch. xiv., § 2, pp. 397 ff.

In this example appear sight, sound, and smell memories, besides the muscular ones involved in the feeling of weariness, and the organic ones accompanying the reproduction of the original emotional state. Many people cannot represent to themselves their past emotions in this vivid way, though they remember perfectly that they felt fear, anger, love, as the case may be, and the circumstances, such as "cold shivers," trembling, quickened heart-beat, &c., which accompanied these emotions. Most people can and do use all these forms of memory to some extent, though visual images tend to occupy a predominant place. The motor or muscular memory is remarkably tenacious and exact, and plays a more important part in our lives than we are at first apt to imagine. It is almost impossible to forget how to carry out the complexes of co-ordinate movements required for golfing, cycling, or playing tennis, when we have once acquired them. Of this tenacity the following incident is a striking proof: Edith Thomas, a child about nine years old, deaf and blind from her fourth year, "was tested by Professor Graham Bell of Washington as to her ability to reproduce by motor imitation the movements of the throat and mouth involved in articulate speech. She succeeded fairly well, pronouncing the letter *k*, which offers peculiar difficulties to deaf mutes, with unusual distinctness. When asked to repeat the letter some hours later, she called with an almost perfect enunciation, Kitty, Kitty, Kitty. Investigation revealed the fact that when at the age of four the gradual loss of speech had followed that of sight and hearing, the last intelligible word spoken by the child was Kitty. The reproduction was unconscious, the child having absolutely no idea of what she had done. It was not, then, a reproduction of the word as heard or as associated with something seen, but a muscular movement which, latent for five years, was recalled by the suggestion of a similar movement."[1] In memorising words most people pronounce them in order to have the advantage of combining motor memories with the visual images. This nascent pronunciation is something very subtle: we find that it can be continued even when for purposes of experiment we pronounce other words aloud. Memories of touch sensations are preserved also, though in most people they fill a very subordinate place. In an American investigation, in which a hundred junior students of psychology were questioned as to their mental imagery, there was found one among their number who declared his images to be mainly tactual. His dreams were exclusively tactual. Numbers were correlated with sensations in the finger-tips; thus the idea of 5 or a multiple of 5 always brought with it a feeling in the tip of the little finger.[2]

§ 7. *Contrast of percept and memory-image.*—If we now attempt to tabulate the differences between percepts and memory-images we shall find that the chief are as follows:—

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[1] Graham Bell, "Muscular Memory," *Amer. Journ. of Psych.*, 1896.

[2] R. H. Stetson, "Types of Imagination," *Psych. Rev.*, vol. iii. p. 398.

1. Percepts are more vivid than images.

2. Percepts are steadier, more definite, and their objects have fixed positions in a filled space in front of us. Images are more fluctuating, and while they also appear to be projected in space, with most people it is not the actual perceived space. Cases are recorded in which an artist, for example, is able to project the remembered face of his sitter on his canvas; but this is abnormal. The space in which the images exist is not a filled space; there is, as it were, a fringe of empty space round our image which we can sometimes fill by an effort of memory, sometimes not.

3. When we attend to percepts our attention seems to be directed outwards; when we attend to images, it seems to be drawn inward.

4. The coming and going of percepts is (if we disregard our power of locomotion and of control of the sense organs) independent of our will; memory-images we can to a large extent evoke at will and dismiss at will.

5. The objects to which percepts refer form a connected and orderly system which is common to humanity; owing to this objective reference we can have our percepts verified or corrected by other people; images are, so to speak, our own peculiar property. Some children are thought by many observers to have considerable difficulty in distinguishing between the world of reality and their own imaginings. In dreams and in the hypnotic trance similar confusion is found.

6. It is probable that there is a real physiological difference in the brain changes underlying percepts and images respectively.

§ 8. *Memory of the emotions.*—We may here advantageously take up the much discussed question of the memory of the emotions.[1] Bain's theory was that the emotions, as such, "have the minimum of revivability; but being always incorporated with the sensations of the higher senses, they share in the superior revivability of sights and sounds." To this Professor James objects that "he fails to point out that the revived sights and sounds may be ideal without ceasing to be distinct; whilst the emotion, to be distinct, must become real again. Professor Bain seems to forget that an 'ideal emotion' and a real emotion prompted by an ideal object are two very different things." Professor Ribot takes up the cudgels for Bain's theory in the following words: "I maintain, on the contrary, that we have here only two different stages of the same thing—the first ineffectual and abortive, the second complete; and the subject which now occupies us must either have been in a very confused state or very negligently treated, for a clear mind like that of W. James not to have seen that affective memories, like others, aim at becoming actual states of feeling." Ribot's theory of memory is that a perfect act of memory would be one which reproduced the state remembered in its entirety: it would thus, in the case of sense memories, become a hallucination. The case of emotional memory may be regarded as parallel; what Ribot terms "a true or concrete memory for feelings" is a revivification or exact reproduction of the feeling remembered; it may be termed an emotional hallucination—that is, an emotion not roused by anything in our present circumstances but centrally initiated. By what he terms "a false or abstract memory," Ribot means that the circumstances are remembered, together with the nature of the emotional effect they had on us, but that no present revival of the emotion is experienced.

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[1] The question of the revival of mere pleasures and pains has been discussed in ch. ix., § 7.

Now the conception of intellectual and emotional memory as thus closely analogous, as phenomena of which the particular instances are found in a series exhibiting all degrees of vividness, from the palest representation of the original experience up to its actual reproduction, is a helpful one and in a sense a true one. But for several reasons it is better to regard the perfect act of memory as that which, while giving a perfectly clear representation of the original experience, yet has in it no element of hallucination. With reference to intellectual memory, these reasons are as follows:—

(1) Memory as an activity of the mind has a much wider range than perception. Thus when we call up a visual image of a room with which we are well acquainted, we see all four walls at once, a thing which would be impossible in perception. If I shut my eyes I can see the wall in front of me at which I have just been looking, but at the same time I can, if I like, see the wall behind me. This reproduction evidently arises from the "traces" left by many acts of perception, and however vivid it might become, it is not easy to conceive of it passing into a hallucination.

(2) Even if we take a case of memory-reproduction of a single act of perception, there seems to be a real psychological difference between the original experience and its copy, which would prevent the latter becoming a hallucination, however "perfect" it might be. It is difficult to say exactly wherein this difference consists: one element in it is certainly the direction of the attention. Thus I visualise as vividly as I can a monument which I know well: I see its form, the grey stone of which it is made, the path along its side

covered with yellow, rounded pebbles, the green grass in front, the blue sky beyond, the railings, the balustrade, the street, and countless other details; but though the vision is before my inward eye, it is not before my physical eye, which is filled with rays of light from the wall-paper, and if these succeed in gaining my attention for a moment, then the vision fades.

(3) It seems probable that physiology will some day be able to draw on the physical side a definite line dividing sensations from memory-reproductions of sensations, and that hallucinations will fall on the sensation side of this line.[1]

When we now turn to the emotional world we find that it is distinguished sharply from the world of the intellect in this respect, that it belongs only to the individual. In a sense we may say that there is no such thing as a hallucination in the emotional world: if you feel in a certain way, that feeling exists for you, and there is no one who can challenge it. But if this emotion belongs to the past—if it is a feeling which the same circumstances would not arouse in you now—then we maintain, as indicated above, that it is akin to a hallucination. One recognises its unreality oneself. A concrete instance will make this clear. If at any time a coveted distinction has been snatched from you by what you considered the unfair conduct of a friend, then so long as you attach value to the distinction, the thought of your loss will bring with it the hot feeling of anger with a bitter sense of injustice; your hands will perhaps clench, your face flush. If this happens frequently you may form a habit, in the shape of a deeply-engrained organic memory. Suppose now your circumstances change, so that for years your loss does not occur to you. Then suddenly you meet the wrongdoer; the whole thing springs to your mind, and with it the emotional manifestation begins. But your values have changed; you no longer mind having lost the distinction; you view your friend's conduct more calmly, perhaps you even begin to think him justified, and you check the emotion at once with a wondering laugh at your own folly. In such cases as these emotion is recognised to belong to the present; it is the expression of our personal attitude towards certain facts. Emotion is the expression of character; therefore it is impossible that certain emotions should be revived when the character has changed. A good emotional memory in M. Ribot's use of the term would mean a character that was set.

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[1] See ch. xiv., § 5, p. 416.

Again, since our emotional attitude is so much the expression of ourselves, the revivability of an emotion depends very much on the mood of the moment. When we are filled with bounding happiness and everything is going well with us, we cannot easily revive a state of depression; but when we are out of spirits it is easy to conjure up our wrongs, and with the thought of them to revive the emotion which originally attended them. This close relation of emotion both to the more permanent self and to the fleeting self of the moment renders it desirable not to press the analogy between intellectual and emotional memory, but to separate the latter altogether from the former as depending upon different laws.

§ 9. *Simple recognition.*—When memory is at its lowest we cannot call up any image of an experience; but we recognise it as familiar if it occurs again (cf. ch. xii., § 3). We frequently have this sense of familiarity in meeting a person for the second time even before we remember his name or anything definite about the first meeting: sometimes we have it on seeing a person we have never seen before, and in this case we often subsequently discover a likeness in him to some other of our acquaintances. The sense of familiarity appears to be due to the fact that the present conscious experience has associations in our mind which were made on the former occasion of its occurrence, and that these are trembling on the verge of consciousness. We all know this feeling of having something in our mind which we cannot force into consciousness: the sense of what we want is perfectly definite,—it is like a hole which nothing but the right thing will fit; it is not a mere vacuum, it is a shaped vacuum. Try to think of some French equivalent which you *know* but cannot remember, and you will experience the feeling referred to at once. The feeling seems to be an awareness of what we must figuratively call the *movement* of some of those psychological dispositions of which, as we have seen, by far the greater part of our mind at any given moment consists. We express this by saying that the associations we are seeking are present in subconsciousness, though not in consciousness. Most probably the feeling is accompanied by the subdued excitation of those cerebral neurones which would enter upon full activity with the appearance of the ideas in consciousness. The belief that a presentation accompanied by this feeling has been experienced before is simply a generalisation; in innumerable cases definite associations have come into consciousness afterwards and been joined to presentations which were originally accompanied only by this feeling of incompleteness; and from an accumulation of these particular instances we have drawn the general conclusion that this feeling is the sign of an experience not wholly new.

The feeling of incompleteness in itself, then, by no means accounts for the feeling of familiarity. The feeling of familiarity, no less than recognition proper, implies that I, who have this experience now, have had a similar one before. It is possible to conceive of the existence of a mind (or say a mental aspect of a brain) which should have conscious experiences, and which might even add to those the results of previous conscious experiences treasured up by means of modifications of brain tracts, and yet have no personal identity;[1] but it is impossible to conceive of such a mind greeting any of its experiences with the words, I have felt this before. It is the fact of recognition which forbids us to dissolve the mind into a mere succession of conscious states; it is on the fact of recognition that our belief in our own continuous existence through time depends.

§ 10. *Localisation.*—The fourth element which we have noted as distinguishable in a complete act of memory is the localisation of its object in our own past experience. This is necessary in such instances as that described at the beginning of this chapter, which is a type of a large class of facts of memory. There are other large classes in which no such localisation is desired. If we call to mind a particular landscape we image it as a fact existing now, and the date on which we actually saw it is of no interest or importance for us. Similarly, when we repeat passages of poetry we have learned, we do not as a rule care when we learned them. The interest in all such cases is centred in the things themselves, not in the things as having made a part of our lives. Other things there are of which the memories are so engrained in us that they form part of ourselves; in this case also the time element is lost—and, indeed, we do not say we remember such things, we say we know them. Our own language, the letters of the alphabet, the names of most common objects, the facts of solidity and weight, these things we say we remember only when we discover that there is a possibility of forgetting them. Many muscular memories, such as the methods of pronouncing words, are similarly engrained.

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[1] Such a mind would be incapable of rising above what we called mere Discernment (ch. xii., § 2).

In the reinstatement of an experience, suggestion or association is often aided by rational construction. Thus in the propositions of Euclid we partly remember the proof, partly construct it in accordance with certain permanent principles. Our own past lives we sometimes reconstruct in a somewhat similar fashion: thus we may determine the order in which we paid a certain series of visits by a consideration of the positions of the houses visited with respect to one another. Our memory pictures of places we check in the same way. For instance we may say, I thought there were daffodils in the grass, but that is impossible as the time was August; or, I seem to remember your cousin at that party, but if, as you say, he was in Italy, then I must be mistaken.

This habit of rational construction of the past, combined with the dislike we feel for our own ignorance, accounts for many errors of memory. A recent writer describes an experiment on visual memory thus: "I show a friend, a good visualiser, a striking cartoon. He just glances at the sketch before I remove it, and I then put to him a number of questions as to the details he has observed. It is surprising how often he is right, and it is instructive to note how often he is wrong. He sees three buttons where there is one. He describes the coachman's boots, whereas in the cartoon they are hidden, covered with a rug. Positive error thus enters into his image." Here the visual image does not admit of blanks, and they are filled up in accordance with the average of experience. Every item in the image, as already pointed out, has many associates, and what wonder if it is not always the most recent that enter consciousness. Again, desire modifies our memories just as it guides our imagination—nay, even affects perception itself. Falstaff is not the only person who remembers himself valiant while others commemorate his cowardice. We work over our memories along with the rest of our mental material, and reduce all to some degree of consistency. If we have a firmly-established belief in ourselves as men of valour, any inconveniently hostile memories will be crowded out of existence.

The process of localisation of memories in past time depends of course on the development of the idea of the past, and its distinction from the present and the future;[1] and also on the capacity to distinguish an *order of succession* in the past. There can be no distinction of present, past, and future *until an experience recurs;* so that there can be a contrast between what is now experienced, what is remembered, and what is expected. "The present is the real or actual, and is determined by our primary presentations, as already seen. But we do not know the present as present until it is put side by side with both memories and expectations. An event *expected* has an interest altogether its own, and puts us into a more active attitude in consequence. The words 'expect,' 'await,'

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[1] We now take up the question as regards the *idea* of time; in ch. xii., § 14, we discussed the *perception* of time.

'anticipate,' all point to an attitude of mind wholly different from the attitude towards present or past. To know a present, as present, we must have, in the consciousness along with it, both memories and expectations, which are of course in the form of ideas or representations. The difference between memory and expectation is, as already said, a difference of attitude and interest: both are distinguishable from the present as being ideal. With a fixed series of events, ABCDE, we know where we are by one being in full actuality, as C, while AB and DE are in ideality; and we know that AB are behind when, in moving on to D, the ideas of AB are fading, and the idea of E rising in intensity, while also engaging the expectation-attitude."[1] We assume that the events ABCDE have some continuity of *interest*, by which attention is guided as it moves from A to B, and so on. When they are past they are remembered in the order in which they occurred or were first attended to. *This is an ultimate fact.* We could learn the alphabet backwards, but only by repeating it backwards as often as forwards. The memory-images of the events ABCDE, provided that some *interest* has given them a continuity of their own, occur in the order *a b c d e;* and if any of them drop out of memory, the order of those that remain is still preserved. Continuity of interest enables us to remember the series as a number of successive events. Apart from such continuity, D, for instance, might not be remembered as occurring after A. Our memory of the *duration* of events, and the *distance of time* at which we localise events in the past, depends on a variety of complicated conditions, and is subject to many illusions. The more strongly interest

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[1] Bain, "Mr James Ward's Psychology," *Mind*, O.S., vol. xi. p. 470; Ward, art. "Psychology," p. 64a.

(with attendant feelings of satisfaction or the reverse) is connected with occurrences, the more delusive is the estimate of their duration.[1]

An analysis of memory leads to many practical deductions. One or two may be mentioned on account of their pedagogic interest.

1. In teaching children, the substance of the lesson should be impressed by as many sense avenues as possible, as each will aid the others. In particular, the muscular memory might be much more largely called into play than it is. Thus, writing in the air, when such things as French accents are being learned; moving the lips when memorising; acting historical scenes, &c., are all devices helpful to children. no.

2. The lessons should be associated with one another as much as possible, and particularly with the interests the children have outside of school hours. This will ensure their frequent reproduction in consciousness.

3. "Cramming" is a psychologically vicious mode of study; time is not allowed for the knowledge thus acquired to be wrought into the fibres of the mind, therefore it soon sinks into obliviscence. Many examinations are unfortunately still constructed so as to favour this mode of preparation. yes

4. Educators should recognise that sense memory, or rather sense memories, can be cultivated; and they should endeavour to frame their lessons so that positive encouragement to the practice of forming sense images is given.

§ 11. *Diseases of memory.*—As has been stated, much of our knowledge of memory is derived from the occurrence of certain diseases of memory or amnesias. These are divided by Ribot[2] into General Amnesia and Partial Amnesia. The former may be temporary, periodical, progressive, or congenital. The first of these often begins suddenly and ends suddenly, the periods varying from minutes to years. It is commonly associated with epilepsy, and characterised by mental automatism; that is, the sufferer continues to act naturally and to speak coherently, but when he comes to himself again has no remembrance of what he has done. This temporary amnesia is often the result of an accident or overstrain, and it frequently affects the knowledge of the events immediately preceding that which causes the injury. Here is a curious instance written by a young lady, aged seventeen. "In the spring of last year (1902) while attending the University I became exhausted through overwork. One afternoon when returning home something seemed to snap in my head, and it went whirling. This itself is clear in memory, but how I got home, or what happened in the next three days, or in the whole preceding month, are forgotten. Of course from what has been told me I know now about what did happen, but it is still impersonal as a story. I have no memory of the lessons we studied, and though during the time I was sick and before it I wrote verses constantly, I do not know them now, or recognise them as my own work."[1] The term retroactive is applied to this form of amnesia. Its common occurrence confirms the theory that time is necessary for the organisation of memory.

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[1] Cf. James, *Text-book of Psychology*, ch. xvii.

[2] *Diseases of Memory* (Intern. Sc. Series).

The term "periodic amnesia" covers those cases of double personality which have aroused so much interest of recent years.[2] Here two sets of organised memories are evolved relatively independent of one another. Certain deeply engrained memories, such as the power to speak, the power to walk, &c., are, however, common to both.

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[1] Quoted from Burnham, "Retroactive Amnesia," *Amer. Jour. of Psych.*, vol. xiv. p. 118.

[2] They may be regarded as relatively independent psycho-physical *dispositions* (ch. iii., § 5). See also ch. xvi., § 5, pp. 457ff.

Progressive amnesia often accompanies old age. In this case, as is well known, recent acquirements perish first, because they are least worked into the fibres of our mind.

Congenital amnesia is found in idiots and imbeciles, but it may co-exist with a phenomenal development of the memory in one particular direction.

Cases of partial amnesia have done much to aid physiologists in their work of brain localisation.[1] If images of a particular type are received or stored in a particular part of the brain, then any injury to that part will interfere with the production of those images. Any type of image may be wholly or partially lost; and this loss may be due to either of two causes: the area itself may be injured, or it may be cut off from its associates, so that they cannot rouse it to action. When recovery takes place it may be due to the fact that the connections are again established, or, in the case of actual injury to the centres themselves, it may be due to the fact that allied elements take up the work: thus it has been suggested that in the case of recovery from aphasia, due to injury of the speech centres, which are usually located in the left hemisphere, the corresponding area in the right hemisphere may, as it were, learn to function in the same way.[2]

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[1] The beginner is warned against being misled by this highly figurative language; but its conveniences are obvious. Of course the images as such have no existence except when in consciousness.

[2] For a discussion of the cerebral action which accompanies the memory process, see ch. xiv., § 5, pp. 412ff.

On the subjects dealt with in the foregoing chapter, see Stout,* *Manual*, bk. iv., ch. i., ii., iii. (Images and Ideas, Trains of Ideas, Memory); James,* *Text-book of Psychology*, ch. xvi.-xviii. (Association, Sense of Time, Memory); Sully,* *Human Mind*, vol. i., ch. ix. Sully carefully reviews the various problems arising out of the subjects which we have dealt with in the foregoing chapter. His treatment of Association is defective in one important respect. He reduces the Laws of Association to one principle, Contiguity, of which he says (p. 296): "By this is meant the association of two or more presentations through, or on the ground of, their proximity in time, whether under the form of simultaneity or succession." But on the same page he also says that the process of association by the link of Contiguity may be regarded as one of "integration or totalisation," "a re-constitution of what was originally given as a whole by means of a recurrence of some of its parts only." This is the "Redintegration" spoken of above (§ 4). Now, if this second statement is true, it is the essential truth; and mere proximity in time is comparatively unimportant. In this respect, Professor Stout has made an important advance by expounding the processes of Association on the basis of the principle that "*a* tends to call up *b* in the *same relation* to itself in which they were originally presented." Sully treats the process mainly from the point of view of his first statement (contiguity = mere proximity in time). Contrast Stout's treatment, *Analytic Psychology*, vol. ii., ch. v., vi., vii., viii. We must also add the following references: James, *Principles*, vol. i., under headings "Association," "Time," "Memory"; Ward, art. "Psychology," pp. 60b-66 (specially valuable as regards the Psychology of Time, pp. 64ff); see articles "Localisation (in time)," "Temporal Sign," and "Time (cognition of)," in Baldwin's *Dictionary;* Bain, *Senses and Intellect* (4th ed.), under headings "Contiguity" and "Similarity"; Robertson, art. "Association," *Ency. Brit.*, vol. ii. (and in his *Philosophical Remains*)

The capacity for estimating duration has been subjected to experiment with more or less definite results: see Külpe, *Outlines of Psychology*, Eng. tr., §§ 63-66 (pp. 379ff), and references under heading "Time (sense of)" in Baldwin's *Dictionary*.

Further important information and references are given in the articles "Apperception," "Association (of ideas)," "Memory," "Memory (defects of)," "Memory (experiments on)," "Recognition," "Reproduction," "Revival," in Baldwin's *Dictionary*. Under the heading "Reproduction," the authors fully recognise the existence of what is called spontaneous revival. When we have an absorbing interest in any person or thing, our thoughts tend to fix on this subject whenever we are not otherwise occupied (cf. § 5, above).

The "memory of feeling" is carefully discussed in all its aspects by Urban, *Psych. Review*, vol. viii. (1891), pp. 262, 360, 432 (cf. ch. ix., § 7, above).

The important question of the relation of Perceptions to Mental Images is dealt with by Wundt and his school (Titchener, *Outlines of Psychology*; Külpe, Ribot) in a way different from that which is defended in this book. All these writers tend to regard ideational consciousness as "merely a more faint and imperfect reinstatement of perceptual consciousness." The physiological grounds for this view are growing weaker as time goes on (see ch. xiv., § 5), and from the psychological side it seems to be nothing more than a case of a "determination to simplify" *in spite* of the facts.

CHAPTER XIV.

IMAGINATION.

§ 1. *Imagination and memory; forms of imagination.* —Although every one knows the difference between what is meant by Imagination and what is meant by Memory, yet it is by no means easy to express this difference in words. From one point of view, Memory seems simply a subdivision of Imagination, — it is, indeed, sometimes called Reproductive Imagination; from another, Imagination is a product of Memory. "Those who try to be artists," says R. L. Stevenson, "use, time after time, the matter of their recollections, setting and resetting little coloured memories of men and scenes, rigging up (it may be) some especial friend in the attire of a buccaneer, and decreeing armies to manœuvre, or murder to be done, on the playground of their youth. But the memories are a fairy gift which cannot be worn out in using. After a dozen services in various tales, the little sunbright pictures of the past still shine in the mind's eye with not a lineament defaced, not a tint impaired." The more we think of the matter the more clearly do we see that the work of the Imagination is to make a mosaic of memories: it is in the workmanship, in the putting together and arrangement, that the art of the master is recognised; not in the creation, but in the selection of materials. Hence much that has been said in the last chapter may be carried forward to this; much that will be said in this may be incorporated with the last.

And yet the very fact that the two processes are recognised as two in language and in common thought, forces us to inquire just where the difference lies. Professor James distinguishes them thus: "The phenomena ordinarily ascribed to imagination are those mental pictures of possible sensible experiences, to which the ordinary processes of associative thought give rise. When represented with surroundings concrete enough to constitute a date, these pictures, when they revive, form recollections. . . . When the mental pictures are of data freely combined, and reproducing no past combination exactly, we have acts of imagination properly so called."[1] To this we must add that the date constituted is a date in our own lives, and that in many cases it is constituted with the utmost vagueness, and amounts only to a conviction that the present imaginative construction does represent some incident or series of incidents which we have experienced before. Here, then, the entire experience is familiar no less than the separate elements; in imagination the elements are familiar, while the experience as a whole is novel. In memory also we consciously endeavour to reconstruct the past—in a sense our end is in our mind from the beginning; in imagination the end is often not foreshadowed in this way, nor is the sense of effort usually present; the flow of thought is free. At times we impose limits on our imagination, as when we seek to construct visions of the scenes described in a book. Many people do this habitually—some cannot prevent the pictures forming, even if they wish. In reading

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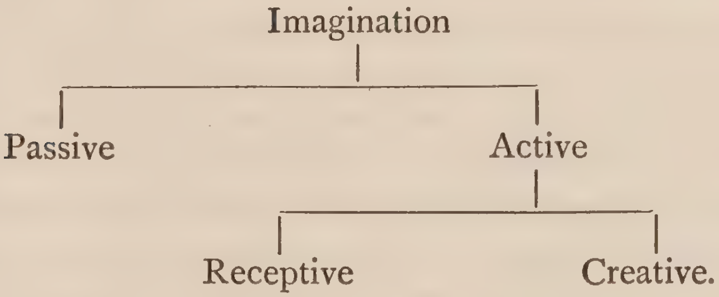
[1] *Principles*, vol. ii. pp. 44, 45.

The Mill on the Floss, for instance, they will have a clear picture of Dorlcote Mill and of its situation with regard to the river, the wood where Maggie and Philip walked, the houses of the village, &c. A friend of mine tells me that she dislikes illustrated books, because the pictures interfere with her own ideas of the characters and places. It is a point worth considering, whether children should not always be supplied with at least some books of a strong pictoric interest without actual illustrations in order that their power of visualisation may be encouraged.

From *The Gate of Death* we take the following example of the constructive imagination at work: "In these hot nights my window is left open, and as I lie awake I often wonder what can be the strange sounds I hear,—sighs, far-off cries, noises as though things fell, musical notes, languid boomings. I suppose they all have some explanation, if one only knew. Many of them are probably very minute noises quite close to me, transformed in my restless brain to loud noises very remote. Last night I heard a burst of music—utterly inexplicable. . . . Half the beauty of these sounds consists in the fancy which compares and likens them to other sounds, and then calls up a scene to suit them. The firs in the garden murmur in the breeze of dawn like a falling sea; and then in my mind I see a golden sand, or a rock-cave with gem-like translucent water, emerald green, lapping softly against the precipitous ledges. Or there comes a faint sigh from the garden alleys, and I think of some wandering woodland nymph, sorrowing for she knows not what, with her feet white on the turf, looking mournfully out of her dark eyes."

This effortless play of association is well known to all of us, and is a very enjoyable mode of turning over our mental treasures. We see that the elements are derived from many different memories, though they are so put together that no remembered whole is constructed. In such cases as the above, doubtless our felt preferences direct the flow of thought more than we are aware, but in deference to the fact that the fancies do seem to "come of themselves," this easy play of the imagination is distinguished as Passive. A great difference is felt between that and Active Imagination, in which we definitely strive (*a*) to picture a scene described, or (*b*) to work out an imaginary situation. These two modes of Active Imagination have been called (*a*) Receptive and (*b*) Creative. The latter may be subdivided again according as our endeavour is (1) towards some intellectual construction, as in writing a story or play, or (2) towards some practical work, as in devising plans for a picnic or making a machine to illustrate perpetual motion, or (3) towards some æsthetic end, as in planning the decoration of a room. These divisions of Imagination (in which we follow Sully) may be tabulated thus:—



In the long stories told by little children the passive imagination is chiefly exemplified: one idea suggests another, and the tale flows on till an end is brought about, not by the nature of the plot—for there is none—but by the weariness of the small narrator. And yet very early in such tales are marks seen which show that the mind in and by its own natural process of growth is developing the power of abstract thought. Thus, if a child tells you of a blue horse the conclusion is obvious that he is abstracting the quality blueness from the various objects wherein he has seen it, and, dissociating "horse" from its usual colours, is combining in his mind the "free" ideas he has thus possessed himself of. Thus "passive" imagination presupposes a high degree of mental activity in isolating or freeing ideas and recombining them in new forms. In the process of freeing his ideas the child is much helped by the conversation of those around him; he seizes upon new words and applies them vigorously, until by a process of selection and exclusion he finds out exactly what things they fit.

The definition of the qualities thus abstracted is intensely difficult; it is only because the mind of the child leaps out to meet your meaning that it is possible to make him understand at all. It is the recognition of this fact that has caused educators to postpone the teaching of such abstract subjects as grammar to an age when the mind may be supposed to have reached by its own growth the requisite stage of development.

Receptive imagination is possible to the child only when his experience has contained the elements of which you wish him to make use. When it is a question of degree, however, it is possible for his imagination to transcend his experience—so much so sometimes that the reality when he comes to know it is disappointing. Thus a child brought up in the lowlands can imagine mountains by adding height to the low hills that he is acquainted with; though I have heard of a child who, being brought up in a flat country, declined altogether to believe in the existence of the Alps.

Of the forms of creative imagination the easiest is that which is directed towards some practical end, because here the attention is turned upon objects of sense. Toys — especially simple adaptable toys — are great helps towards the development of this form of imagination. Making verses appears as an early pursuit of some children, the rhyme and the rhythm being to them sensible objects.

It must, of course, be clearly understood that in real life the forms of imagination do not exist thus sharply differentiated; on the contrary, they shade imperceptibly into one another, and may frequently all be found exemplified in a single imaginative process.

§ 2. *Types of imagination.*—Apart from these general classes, examples of which occur every day in all of us, there are *types* of imagination just as there are of memory—*i.e.*, individuals vary as to the sense terms in which they habitually represent the incidents they imagine, and within these types there is every gradation of vividness. The special sense terms we habitually make use of we treat as symbols only; we *mean* by them not only themselves but others associated with them in sense experience, and by voluntary effort we may bring these others actually into our minds. Thus the writer of the lines quoted on p. 394 might no doubt by dwelling upon his vision of the sea have raised tactual memories of the cool slipping of the water through his fingers, and motor memories of its resistance as he pushed his way through it. Taste and smell associations might also be roused, and no doubt, although it is not so stated, the whole experience was accompanied by an organic tone appropriate to it.

Of the different senses, the imagery of sight, being predominant with most people and lending itself most easily to clear description, has been most studied. Mr

Galton seems to have been the first in this country to realise the enormous differences in the degree to which individuals possess this faculty. So great are they that although we all habitually talk in terms of visual imagery, yet some of us do so just as a blind man uses the terms of his seeing brother. One or two statements quoted from the works[1] mentioned below will enable the reader thoroughly to realise these differences.

1. "It is only by a figure of speech that I can describe my recollection of a scene as a 'mental image,' which I can see with my 'mind's eye.' I do not see it . . . any more than a man sees the thousand lines of Sophocles, which under due pressure he is ready to repeat. The memory possesses it, &c."—Galton, p. 85.

2. "I can see my breakfast-table or any equally familiar thing with my mind's eye quite as well in all particulars as I can do if the reality is before me."—Galton, p. 90.

3. "I am unable to form in my mind's eye any visual likeness of the table whatever. After many trials I can get only a hazy surface, with nothing on it or about it. I can see no variety in colour and no positive limitations in extent, while I cannot see what I see well enough to determine its position in respect to my eye, or to endow it with any quality of size. I am in the same position as to the word dog. I cannot see it in my mind's eye at all; and so cannot tell if I should have to run my eye along it if I did see it."—James, *op. cit.*, vol. ii. p. 57.

4. "There is very little limitation to the extent of

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[1] Galton, *Inquiries into Human Faculty*. Very full extracts are given by Professor James in his *Principles of Psychology*, vol. ii., chap. xviii.

my images: I can see all four sides of a room. I can see all four sides of two, three, four, even more rooms, with such distinctness that if you should ask me what was in any particular place in any one, or ask me to count the chairs, &c., I could do it without the least hesitation. The more I learn by heart the more clearly do I see images of my pages. Even before I can recite the lines I see them so that I could give them very slowly word for word, but my mind is so occupied in looking at my printed image that I have no idea of what I am saying, of the sense of it, &c. When I first found myself doing this I used to think it was merely because I knew the lines imperfectly; but I have quite convinced myself that I really do see an image. The strongest proof that such is really the fact is, I think, the following:—

"I can look down the mentally seen page and see the words that commence all the lines, and from any one of these words I can continue the line. I find this much easier to do if the words begin in a straight line than if there are breaks."—James, *op. cit.*, vol. ii. p. 57.

In the investigation referred to on p. 376, it was found that of the hundred persons examined as to their habitual forms of imagery, 82 pronounced themselves mainly visual, 6 auditive, 4 motor, 1 tactual, 5 equally visual and auditive, 2 equally visual and motor. Such a concept as *riding-a-wheel* was largely represented by distinct feelings of motion in the legs or in the whole body, as in mounting.

Ribot found that of the sixty persons he examined with respect to taste and smell images, 40 per cent had no such images, 48 per cent had some, 12 per cent could call up all, or nearly all, at pleasure.[1] These images are nowadays of comparatively little practical use and it is quite possible that they are present in some faint degree more often than is recognised by their owners: thus when we think steadily of salt with a view to calling up its taste, the resulting state of mind—even when no vivid image arises—is quite different from the one we produce when we think steadily of sugar. Indeed, the fact that we *recognise* tastes when we meet them, proves that some modification corresponding to a memory image is present in us, even when we cannot call up at will anything approximating in vividness to the actual sensation. It has been proved by many experimenters that the power of visualising can be greatly improved by practice, and it is probable that similar effects might be produced in the other sense memories.

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[1] *Psychology of the Emotions*, pt. i., ch. xi.

Kinæsthetic images of words play an enormously large part in many people's thinking. So largely do these images bulk, that although we know that conceptual thinking must underlie and determine the flow, it sometimes seems as if introspection could detect nothing in consciousness save this steady verbal procession. One evening, after using the typewriter for some hours during the day, I found myself, to my amazement, accompanying my thinking, after I went to bed, with distinct images of the finger movements necessary for the use of the instrument. Probably somewhat similar images accompany the thinking of some deaf mutes.

This leads us to ask whether there is a form of imagination[1] which does not involve any sensory images at all. The most promising field in which to look for such a phenomenon would be of course in the field of abstract thought. Mr Stetson found that the concepts "relation," 'classification," "cause and effect," gave rise to images in the minds of about half of the class he examined; these images usually consisted of a motor element, which was often combined with a visual element. Concepts must of course be *associated* with images, because it is out of particular images that the concepts have been formed; hence we should expect that if we dwelt on a concept images would arise. But the question is, Do we grasp the concept by means of the image, or is the understanding of the meaning a distinct stage upon which the formation of the image follows? In a train of abstract thought, where no individual concept is dwelt upon in such a manner as to bring into our consciousness the associated images, is there, as a matter of fact, any succession of such images?

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[1] The word is of course used in its widest sense here, and so includes memory.

The conceptual imagination—if it exists—should be highly developed in philosophers and men of science, and these men Galton found to be notably poor in the power of forming visual images. But a very common accompaniment of conceptual thinking is sensations of the nascent pronunciation of words; when kinæsthetic images of this kind exist, the memory is not "imageless," seeing that the word "image" in this connection is understood to cover representations in terms of any sense. An extreme instance of this correlation of speech images with conceptual thinking is presented by Professor Stricker, who says:—

"When after my experimental work I proceed to ts description, as a rule I reproduce in the first instance only words, which I had already associated with the perception of the various details of the observation whilst the latter was going on. For speech plays in all my observing so important a part that I ordinarily clothe phenomena in words as fast as I observe them."—James, *Principles*, vol. ii. p. 63.

The word is of course the least misleading image to accompany the concept that we can have, because its implications in comparison with a visual image, for example, are so few. Very imaginative people are entirely unable to rest content with the bare word: some picture, often of a very elaborate nature, flashes up at once to illustrate it. Thus Mr Canton in his delightful book of Children's Sayings reports the following: "When I say my prayers, I always see everything. When I say, 'Deliver us from evil,' I see God going out with a spear to fight Satan; and when I say, 'Forgive us our trespasses,' I see Him with a big rubber cleaning a black board." Similarly the author of *The Gate of Death* already quoted, says: "If I think of cruelty or liberality, I either see a scene which illustrates it, or at all events I recall a personality which possessed or possesses the quality." This liveliness of the visual imagination is obviously a stumbling-block in the way of abstract thinking, for details in the image which are wholly unessential to the concept may distract the attention from those that are essential. On the other hand, there is no doubt that those people who have lost the use of "that inward eye, which is the bliss of solitude," have lost with it one of the highest and purest pleasures of life.

The association of a concept with the word which represents it is very close. We sometimes feel that we have an idea of relationship, or some abstract notions as it were, stirring in our minds which we cannot express in speech. But we feel also that this knowledge is in high degree vague, and it does not become clear even to ourselves until we crystallise it into words. Again, when we seek to reproduce the substance of a somewhat abstract book—one in connection with which we formed no sense images—we do not reproduce the words in which we received it; we reproduce the ideas in new words; and this particular chain of words, which have not before been connected together in this form, must owe their connection to that of the concepts, which thus have an existence prior to them.

This whole question is rendered clearer and less abstract by a consideration of it from the physiological point of view. We have seen already that the work of the brain is highly specialised; the speech centres, we have seen, are four in number, and these speech centres—or the area where modifications capable of giving rise to word images have been formed—are not thought to be the storehouse of the "ideas" belonging to the words. Many physiologists think that this storehouse is in the frontal lobe; that is, that it is by the work of the frontal lobe that concepts are formed, and that it is by means of modifications of the frontal lobe that they are preserved. If this be the case, then the frontal lobes are, as it were, the central office of the brain, and any excitement in them may spread to any one of the sensory areas: if, however, the activity begins in one of the sensory centres, then its transmission is limited to certain defined areas of the cortex, unless by attaining to the frontal lobe it gains access to the enormous number of pathways that there converge.[1] If we express the same thing in psychological language, we should say the thought of an abstract concept or of some intellectual synthesis may call up in our mind any one of the host of sensory images from which the concept has been constructed; but although all these individual images are thus brought together in the concept, any one of them could not directly suggest any other, but only indirectly by first suggesting the concept.[1]

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[1] Cf. Bianchi, *Text-Book of Psychiatry* (Eng. tr.), pp. 252-254.

As an illustration of what has just been said, consider this metaphor from the Biglow Papers :—

> " We begin to think it nater
> To take sarse and not be riled :
> Who'd expect to see a tater
> All on eend at bein' biled ? "

There cannot be any direct connection between the first two lines of this verse and the last two ; the connection is in the concept, " suffering ill-treatment without remonstrance." In all figurative language there is this conceptual link, of which the physical aspect is the passage of the nervous disturbance through the suprasensory or " higher " centres of the brain. In these cases the conceptual link is hardly ever clothed in words —that is, the track connecting it with the speech centre is not traversed ; nevertheless it is present in thought in so far as it acts as a bridge rendering possible the passage from one image or idea to the other.

This imaging of the process of thought in terms of brain centres and paths gives us at least an illuminative illustration—illuminative, because so concrete—of the manner of our thinking. And it does not seem clear why, if we can have a succession of visual images, say, apart from their associates, we should not be able to have a succession of concepts apart from their associates. Most psychologists, however, consider that the concept cannot be evoked apart from the verbal image ; and, as we pointed out above, introspection finds it very difficult to pronounce absolutely upon the nature of what does exist along with the word.

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[1] Any telephonic system with its central office affords a perfectly sound analogy.

In connection with the types of imagery, it is perhaps well to mention the curious associations[1] that some people have in imaging: thus letters or sounds may be associated with colours; a friend of my own tells me that a page of print is to her full of colour, all the *i*'s being red, the *s*'s yellow, the *g*'s greenish, &c. Numbers, the days of the week, and the months are sometimes associated with visual schemes, so that a particular number always has a particular position. Pictures of these forms have been published by Mr Galton. These associations seem to be, however, only individual peculiarities, so that we must not allow them to detain us here.

§ 3. *Images on the field of darkness.* — Recent researches into visual images seem to indicate the existence of two classes of them between which such a sharp line of distinction can be drawn that they may be said to differ in kind. In the *Psychological Review*, vol. i. p. 351, Professor Ladd published a short paper entitled "Direct Control of the Retinal Field." He attempted, his eyes being shut, to call up forms on the field of darkness then before him. "I was soon able," he says, "by attentive willing, to cause a cross or a circle, or two concentric circles, to appear on the retinal field." He induced sixteen other people, all trained observers, to experiment in the same direction. Of these, four reported no success, nine partial, while three were soon able to produce images and to colour them at will. In one case, when the eyes were focussed on white paper after the experiment, a cross of complementary colour was obtained.

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[1] Galton, *Inquiries into Human Faculty*, pp. 114-154.

The visual images which Meyer describes (quoted by James, *op. cit.*, vol. ii. p. 66) seem to belong to this class. He carried on his experiments with closed eyes, and at first found it very difficult to get any results; later his endeavours succeeded so easily, he says, "that I am surprised they did not do so at first, and I feel as though they ought to succeed with every one." He, too, obtained the after-image. "Most of these subjective appearances," he says, "especially when they were bright, left after-images behind them when the eyes were quickly opened during their presence. For example, I thought of a silver stirrup, and after I had looked at it awhile, I opened my eyes, and for a long time afterwards saw its after-image."

Many of the instances given by Mr Galton in his paper on "Visionaries"[1] seem similar to those here considered. I quote an interesting description of a "vision" which was received from Mrs Haweis:—

"All my life long I have had one very constantly recurring vision, a sight which came whenever it was dark or darkish, in bed or otherwise. It is a flight of pink roses floating in a mass from left to right, and this cloud or mass of roses is presently effaced by a flight of "sparks" or gold speckles across them. The sparks totter or vibrate from left to right, but they fly distinctly upwards, they are like tiny blocks, half gold, half black, rather symmetrically placed behind each other, and they are always in a hurry to efface the roses; sometimes they have come at my call, sometimes by surprise, but they are always equally pleasing. What interests me most is that, when a child under nine, the flight of roses was light, slow, soft, close to my eyes, roses so large and brilliant and palpable that I tried to touch them; the *scent* was overpowering, the petals perfect, with leaves peeping here and there, texture and motion all natural. They would stay a long time before the sparks came, and they occupied a large area in black space. Then the sparks came slowly flying, and generally, not always, effaced the roses at once, and every effort to retain the roses failed. Since an early age the flight of roses has annually grown smaller, swifter, and farther off, till by the time I was grown up my vision had become a speck, so instantaneous that I had hardly time to realise that it was there before the fading sparks showed that it was past."

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[1] Galton, *Inquiries into Human Faculty*, pp. 155-177.

Ribot in his *Diseases of Memory* states that Wundt can think of a colour so vividly that he obtains subsequently the complementary colour. Binet in his *Psychology of Reasoning* says that his colleague, Dr Charles Féré, is able to perform this experiment successfully, while he himself always fails; his failure he attributes to the fact that he is a poor visualiser. These writers assume that these are ordinary visual images; we believe, from the fact that complementary colours were obtained, that they were images on the field of darkness—or possibly projected into perceptual space; and we maintain that ordinary visual images are not so placed.

Our reasons are as follows:—

We have questioned several excellent visualisers, and their experience agrees with our own—that images do not exist in perceived space, but in a space of their own, which is not related to perceived space; we ourselves, in a sense, exist in this imagined space, for we can locate the images with reference to ourselves—*i.e.*, above us or below us, in front of us or behind us, but no object of the perceived world exists in it.

We have requested the same friends to attempt to form images on the field of darkness. Uniform failure has been the result.

We have requested them to image a coloured cross as vividly as possible, and thereafter to open their eyes suddenly on a sheet of white paper. No result followed, and this in spite of the fact that one of these subjects visualises so vividly that she habitually paints from her images; moreover, she expected to obtain some form on the paper.

We have ourselves experimented in the same directions. Our results tend to show that one of the writers of this book—who is a *good visualiser*—obtains this special kind of visual image rarely, and with great difficulty; the other writer, who is a *bad visualiser* (especially for *colours*), obtains such visual images (brilliantly coloured) frequently and with comparative ease, and has been able to establish a certain degree of voluntary control over them. The most striking case of an after-sensation in connection with such an image is stated as follows: "Recently, lying half-awake but with eyes shut, I saw an intensely vivid image of a face of an old woman, a very pleasant face, except that the eyes were so bright as to be repulsive. It lasted about two seconds, leaving a distinct negative after-sensation of the eyes—two dark spots, my own eyes being still closed." The results further bring out a fact of conclusive significance as regards the difference between these visual forms and ordinary mental images: these visual forms may themselves give rise to ordinary visual memory-images just as percepts do. The writer can recall numerous memory-images of such visual appearances.[1]

We consider, then, that these images on the field of darkness must be placed in a class by themselves, being more nearly akin to hallucinations than to ordinary visual images. The point is one which requires further observation and experiment.

When we turn to the other senses we find interesting analogies. Thus some people are able to produce a sensation on any part of the skin they select. With reference to this Meyer's statement is as follows: "On the skin I easily succeed in bringing out suggested sensations wherever I will. But because it is necessary to protract the mental effort, I can only awake such sensations as are in their nature prolonged, as warmth, cold, pressure. Fleeting sensations, as those of a prick, a cut, a blow, &c., I am unable to call up, because I cannot imagine them *ex abrupto* with the requisite intensity. The sensations of the former order I can excite upon any part of the skin; and they may become so lively that, whether I will or not, I have to pass my hand over the place, just as if it were a real impression on the skin."[2]

In the case of smell and taste, many of the instances of revival which M. Ribot has collected appear to be quite comparable to the actual sensations. Here is one answer to the question, "Can you perceive, here and now, the scent of roses, and, if so, of what kind?" "I perceive it *in genere;* but, on further persevering, I find it to be the scent of withered roses. The visual representation occurs afterwards."[1] Notice also the *scent* which accompanied Mrs Haweis's vision of roses.

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[1] The following is a case of the appearance of colours. "On a night railway journey, when it was impossible to sleep, I noticed coloured patterns forming themselves before my closed eyes: the colours were quite distinct, and were arranged in bunches, so to speak, while wavy lines connected the different bunches. I could not detain the patterns; each stayed a very short time, and then changed into another."

[2] James, *Principles of Psychology*, vol. ii. p. 66.

Vivid auditory images are by no means uncommon. The "voices" of Joan of Arc are not an isolated phenomenon in history. Many students, when going over their notes, seem to hear the voice of the professor as he delivered them.

§ 4. *Hallucinations and illusions.*—It is evident that images of this extremely vivid nature, when they are projected, as in the case of Joan of Arc, into the spatial world of perception, are almost, or quite, indistinguishable from hallucinations. A hallucination is defined as a subjective perception; that is, it is a perception produced by a process occurring in the subject and not by any external object. Isolated instances of hallucinations are not uncommon in normal individuals; while the literature of insanity simply abounds in them. They may arise in any sense, but vision and hearing are probably the arch-sinners. They sometimes affect conduct to an extraordinary degree, as is shown by the following example:—

A Sicilian shoemaker "was offended by a lady, who called him a drunkard. Indignant at this he hurled abuses at that lady in return, and she thought it well to avenge herself by referring the matter to four local peasants, of whom he was so much afraid that he remained hidden in his own house for three days. One of these nights the devil appeared to him in a dream and said: 'Take your choice; either cut off your right hand or be murdered by the four men.' In order not to lose his life and soul, he thought, still dreaming, that he would content himself to live minus one hand; then, having awakened, he continued to see the devil beside him, enjoining him to cut off his hand. Terrified by the vision, he was uncertain whether to execute the order or not, either through the inhibition produced by fear or on account of the pain he would have to suffer. He raised an objection to the diabolical vision, from which he received a further injunction, with the assurance that he would suffer no pain. It was then that he gave a look to an old saw, 'and, aided by the devil himself,' to use his own words, he sawed off his hand without feeling any pain, for his arm seemed 'as though made of wood.' As soon as he had completed the mutilation of his hand he felt pain, and, terrified by the amount of blood he was losing, attracted attention by his loud shrieks."[1]

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[1] Ribot, *The Psychology of the Emotions*, pp. 145, 146.

It is customary to distinguish from hallucinations *Illusions*, which may be defined as false interpretations of sense stimuli; in this case there is an actual sense basis, but the mind constructs on this basis a percept which does not correspond to reality. These misinterpretations are frequent enough in the experience of all of us. I append an example from my notebook.

Coming home recently I saw a hansom with two horses drive across my path. I had time to think "surely a hansom and pair is a novelty," before I saw that there was only one dark-brown and white horse; the white appeared very strongly along the ridge of the backbone, and looked like a second horse on the far side. Only after the sound called my attention to itself by stopping, did it flash into my mind that I might have *heard* there were not two horses.[1]

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[1] *Text-Book of Psychiatry*, Bianchi (Eng. trans.), p. 211.

This example illustrates the hesitation of the judgment which, as it were, telegraphs down to the eye, "Don't understand. Report again," and also the possible correction of the error by another sense.

§ 5. *Theories regarding the physiological accompaniments of imagination and memory.*—When we consider the psycho-physical parallelism which obtains between mind and brain it is obvious that there must be physiological differences corresponding to the mental differences which we have just described. We proceed, then, to ask ourselves, What are these differences in cerebral activity?

We have said it is obvious that such differences must exist, but to some psychologists it is the very opposite statement that has been the obvious assumption. Thus Bain says: "The renewed feeling" (*i.e.*, the image, as we have called it) "occupies the very same parts and in the very same manner as the original feeling, and no other parts and in no other assignable manner." Ribot adopts this theory, with scarcely any discussion, in his *Diseases of Memory;* in his *Psychology of the Emotions* he works out a theory of memory of feelings (cf. p. 378), which he generalises in this way: "The ideal of every recollection is that, while keeping its character of being already experienced, it should be adequate in such measure as was possible for the original impression. The revival of impressions is an internal operation, whose extreme form is hallucination."

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[1] The student is strongly advised, while he is studying psychology, to keep a record of his own mental processes. Instances of the different sense-images, of errors in memory, of difficulties in recollection, of illusions, processes of creative imagination, of day-dreaming, of association, &c., occur every day; and if these are noted down, a mass of material will soon be accumulated which will be of the utmost value in lending interest and life to the subject. In America many students have kept records of their dreams in order to see what sense memories appear in them.

To every writer who holds to the belief that the seat of sensation and imagination is the same, hallucination must appear as the perfect form of memory; we maintain, on the contrary, that the "perfect" image contains in it no element of hallucination, and that when hallucination does occur it is not a culmination of the normal power of image-making, but a stepping aside from it.

The evidence of the images on the field of darkness seems to show that we can, as Professor Ladd puts it, obtain direct control of the retinal field. Professor James considers that the after-image formed in such cases may be counted as evidence that the nervous current can flow backward down the optic nerve, and, thus affecting the retina, give rise to sensations.[1] He points out that, if this be the case, it forms an exception to all we know of the habits of nerve-currents, which, as we have seen, flow only one way (towards the centre in the case of sensory nerves, towards the muscles in the case of motor nerves). It seems, however, more consistent with our other knowledge to suppose that in such experiments the retina is unaffected, but that the cells of the cortex, below which no consciousness arises, are by central initiation induced to function as they would in the case of a percept produced by retinal excitement. Another hypothesis is that these forms are due to a concentration of the attention on certain of those floating specks which can by many people be distinguished on the field of darkness. This theory is indeed supported by a certain amount of evidence, and may, in many cases, be the true explanation both of these forms and hallucinations. Bianchi says: "I have observed a gentleman, well known in high commercial circles, who, after a hæmorrhage into the retina, became the subject of visual hallucinations (persons, animals), of which he always took exact account, and which gradually disappeared in proportion as the extravasated blood became absorbed. In general, however, the artificial irritations of the peripheral nervous expansions reproduce not exactly the concrete images of objects, persons, and places, but elementary phenomena of the same sensation. If we press the ocular bulb in the dark, or stimulate the optic nerve with electricity, we see flashes of light, circles, discs, and similar phenomena. Excitations of the acoustic nerve provoke tinklings, whistlings, and noises, as when the acoustic nerve is stimulated with the electric current."[1] Such cases seem more akin to illusions than to hallucinations proper. The question whether the end organs are called into play is, however, evidently a physiological question of fact, and as such we leave it to the expert in that department. Let us suppose simply (a supposition which is unaffected by the question of the end organs) that the cortical cells which function in hallucination are the same as those which function in perception, and that they function in the same way—that is, that hallucination and perception are, from the point of view of the cortical neurones, indistinguishable.

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[1] *Principles*, vol. ii. pp. 70, 71.

Now is the physiological distinction between perception and imagination proper (*i.e.*, exclusive of hallucination) simply this: that the cells function "more faintly" in the latter case, but are identically the same? If this hypothesis were true, that the difference is one of degree only—then it would appear that the brightest of images should seem just about to pass over into the faintest of sensations, and, on the other hand, if we fix our attention on a very faint sensation, our feeling ought to be that if it became one degree more faint we should have, not a faint sensation, but a brilliant image. These logical extensions of the theory do not seem to us to tally with the facts of the mind, where the difference, as we have already urged, seems to be one of kind, not of degree.

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[1] Bianchi, *Text-Book of Psychiatry*, p. 215.

Let us now take the hierarchical conception of the brain—a theory on which we have already laid much stress—and see whether with its aid we cannot evolve a hypothesis which, if not yet a demonstrable truth, is, nevertheless, in accord with the tendencies of physiological thought at the present day, and which will present a true symbol of the psychic side of the phenomena considered.

A perception consists of (*a*) a sensation element and (*b*) a memory element. If we see a chair the sensation element derived from the excitation of the retina combines with memory elements derived from former tactual and muscular sensations which give the ideas of solidity, hardness, softness, &c.

If we hear the sound of the bagpipes, an auditory element derived from this sensation combines with memory images of sight, &c., so that we have a percept of a Highlander with his instrument marching up and down. (The word percept is usually confined to those experiences which have their basis in the sense of sight or touch, but this seems merely a question of where we are in the habit of laying the emphasis.) Let us suppose that this combination can take place only when the functioning of the cortical cells which are brought into action by the periphery is "reflected" on a higher level, and that it is on this higher level that the actual combination takes place. Let us call the cells which are stimulated immediately from the periphery cells of level A, and those which combine in the formation of a percept cells of level B. In every percept some cells of level A will function whether in the kinæsthetic, visual, or auditory area, and along with these will function cells of level B of the same and of other areas; when the cells of level B function without any of level A we have a memory-image. In hallucination and the like phenomena some of the cells of level A also are centrally excited, but this is exceptional and abnormal.

This conception can be carried further in this wise: When we form generic images a further reflection to a higher level and elaboration there takes place; when we form concepts a higher level still is called into play. This is of course only a schematic presentation; what actually takes place must be infinitely more complicated than is here suggested; but this scheme at least gives us, as it were, a working model which is helpful in rendering our conceptions clear to ourselves.

If the student is interested in this question, the following references will be found useful:—

James, *Principles of Psychology*, vol. i. pp. 49-51, vol. ii. pp. 72-75.

McDougall, *Physiological Psychology*, "Temple Primers," pp. 85-87.

Bianchi, *Text-Book of Psychiatry* (Eng. trans.), part ii., ch. i., "Physio - Pathology of Perception," and ch. iii., "Physio-Pathology of Memory."

Tanzi, *Text-Book of Mental Diseases*, ch. i.

§ 6. *Limitations and dangers of the imagination.*—

Imagination we have already seen to be dependent on experience. We cannot, for instance, imagine a sensation entirely new to us—one which does not belong to any of the sense types we know: thus a man blind from birth cannot form any idea of what visual sensations are like. We cannot *create* even in terms of those senses with which we are familiar; thus, we cannot imagine an entirely new colour or new sound, one which contains in it no reminiscence whatever of the colours or sounds we have experienced. There are also individual differences in the degree to which we can dissociate and recombine the elements of our experience. Thus some people cannot imagine colour without texture: some have a difficulty in combining elements that have never been combined in perception; for example, it is not altogether easy to imagine a blue face or an organ sounding like a flute. Such incongruous combinations perhaps occur more readily in dreams, in which there takes place an automatic play of sense-imagery uncontrolled by the judgment. Some people have more power than others to transcend by aid of imagination their own experience. Thus a wealth of sympathy may be offered by a child who certainly does not owe to experience his ability to place himself in the position of the sufferer.

The stream of imaginative thought has a continuity of its own, and often sensations and perceptions are felt as violent and unwelcome interruptors of this continuity. Sometimes when we are very much absorbed in our own thoughts these interruptions even fail to make themselves felt. For a considerable period of time we may relegate the conduct of our own affairs to a species of automatism, while our real life is wrapped up in that depicted in a book. Every one knows the blank feeling of "having come to an end" when a book of absorbing interest is finished. Sometimes this imaginative life is one which we create for ourselves. Here is a curious example: "Sir James Mackintosh was a man who mixed much in the world and took a forward part in public affairs; but from his youth upwards he led another life of curious reverie. He was the Emperor of Constantinople, his friends were his ministers and generals. In endless day-dreams he saw transacted the history of his empire, he watched the intrigues of his palace, he gave rewards to his faithful servants, and formed alliances with neighbouring Powers."[1] The tendency of such a habit as this is evidently towards a divorce from real life. It also tends to render will-power inefficient, as noted in the following case. "A. B. remembers that as early as the age of eight years he was a dreamer, and says that his day-dreaming has been the happiest part of his life, but that 'it has made it very hard, sometimes next to impossible, to pay attention to anything dull or abstract. All the will-power I can bring to bear only serves to pull my mind back to what it ought to be busy with, instead of keeping it steadily focussed there. If one could dream up to the limit when one ought to dismiss it entirely and attend to the sterner things of life, I think day-dreaming would be a veritable gift from the gods. But it is a curse when the habit becomes so fixed that a man can't pay attention to things which perchance have little natural interest for him.'"[2] The great remedy for a state of affairs like this—when there are symptoms of its occurrence in a child—is handiwork of a kind which is not monotonous,—that is, which requires attention. Any hobby which necessitates the turning of the mind towards outward things—such as some form of athletic exercise, photography, collecting and mounting specimens, &c.—will prove remedial. A certain amount of day-dreaming is of course only the legitimate exercise of a very valuable power, and frequently the castles we build in this way, when closely associated with our real life, prove sources of inspiration instead of stumbling-blocks.

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[1] E. S. Dallas, *The Gay Science*, vol. i. p. 236.

[2] T. L. Smith, "The Psychology of Day-Dreams," *Amer. Journ. of Psych.*, vol. xv. p. 465.

§ 7. *The work of imagination in building up the world of reality.*—When the imagination constructs worlds of its own, these have their own laws, which in many points resemble the laws of the world of reality, but also in many points differ from them: *the* great contrast, however, between these imaginative worlds and the real or perceptual world is that the former belong to the individual, the latter to humanity. But of this real world we enjoy only fragmentary views; and the completion and unification of these views—on which rests our idea of the world as a whole—is eminently a work of the imagination. What we perceive at any moment is a mere fragment of our surroundings. I see at present about half a room or less; I see a table with various things on it, about half of two walls, a tiny piece of floor; yet the rest of the room, the ceiling above me, the wall behind me, &c., is subtly present to my mind though I am not thinking of it. Were there a blank behind me, even though none of my present sensations were changed, yet my total state of mind would be quite different. An experiment that brings vividly home to us the fact that we continually live in a twofold world—viz., that of actual perception and that of memory or imagination—is described by Professor G. M. Stratton in the *Psychological Review*, vol. iv. p. 341. It is a well-known fact that an image cast by any object on the retina is inverted. Professor Stratton had made for himself a pair of glasses which turned this image "right side up," and were so arranged that no light reached his eyes except through them. The consequence of this was that everything appeared to him upside down, and that if he walked, as he thought, towards an object, he found himself going away from it. His motor and touch world was at variance with his visual world, and one curious result was the feeling of misery that this occasioned. But the point that we wish to lay stress on at present is that his memory world was dislocated from his perceived surroundings. He thought of the part of the room behind him as he used to perceive it; consequently every alteration in the retinal field came on him with a shock of surprise. Normally every movement of the head of course alters to some extent one's field of view: this is an alteration in the line which divides the perceived environment from the memory environment. In ordinary experience this takes place without any jar, for what is now brought before the eyes has been subconsciously present to the mind all the time. But when, as in Professor Stratton's experiment, the subconscious continuation of the environment does not *fit* the part present to consciousness, then the adjustment takes place with effort and uneasiness.

Now the larger environment which is subconsciously present to all of us is not, like the lesser one, mainly a matter of memory, but is literally a creation of the imagination. No one has *seen* the world afloat in space, yet our visual image of the world as a whole is actually a globe afloat in space. The one demand we make of this imagined circumstructure of ours is that it shall fit our perceived environment at whatever point we choose to apply the latter. The microscope, which introduced new possibilities to perception, has marvellously modified our imagined surroundings, adding new possibilities on every side. On the other hand, fairies, brownies, anthropophagi, and men whose heads do grow beneath their shoulders, once denizens in the world of every cultured man, have been banished from our environment, because at no point do we believe it possible for them to enter on our world of perception. Just as the worlds of the different senses must in man correspond point for point, supplementing and never contradicting one another, so must his imagined world dovetail into his sense world. If incongruity occurs, our spirits cannot rest till we have introduced harmony. This is true not only of the material world, but of the world of human beings. A man who has come to sudden poverty and been deserted by his former friends, finds a sudden dislocation between the world he is now immediately conscious of and the world which formed in him a psychological disposition. The latter had been for him peopled by kind and congenial friends, spirits like the friends he knew; now that he recognises these as false hypocrites, his world of imagination teems with their fellows: he grows a misanthrope and hates mankind.

The examples we have given illustrate the importance of distinguishing between the two kinds of Imagination—fancy, which is, comparatively speaking, passive, and *constructive* imagination in the stricter sense, which is comparatively active (cf. § 2). "Coleridge quotes as an example of fancy the following verse from *Hudibras*:—

> 'The sun had long since in the lap
> Of Thetis taken out his nap,

> And like a lobster boyl'd, the morn
> From black to red began to turn.'

As an example of constructive imagination he refers to Milton's description of the approach of the Messiah to battle. The words 'far off their coming shone' gather the whole into the unity of a single picture. It is manifest that constructive imagination requires more sustained and strenuous activity than the mere play of fancy; for it can only utilise those suggested ideas which subserve the development of the general plan and enhance the total effect. Fancy, on the contrary, is free to pass from one combination to another with only a comparatively slight thread of connection (*e.g.*, harmony) with the predominant mood, as gay, comic, pathetic, pensive, &c."—(Baldwin's *Dictionary*, art. "Imagination.") Of course there are "border cases" which may be referred either to "fancy" or to voluntary construction.

All kinds of mental construction (and Imagination among them) have been much neglected by psychologists hitherto. We give the following references, which will guide the student to further study: Sully,* *Human Mind*, vol. i., ch. xi.; James, *Principles*, vol. ii., ch. xviii.; and Ribot, *The Creative Imagination* (Eng. trans.),—a valuable monograph.

When imagination, as constructive, is guided by education, knowledge of fact, and reference to natural law, it becomes distinctly conceptual in character (see ch. xv.), and gives us our conceptual knowledge of the world of physical things and other beings in time and space, as distinct from our merely perceptual acquaintance with them. How great this difference is, the student will realise for himself if he contrasts the scope of his ideas of the real world at large and the universe, with the contents of his present sensuous perception. This *ideal construction* of the external world is treated by Stout,* *Manual*, bk. iv., ch. vi.

On Illusions and related topics, see also Parish, *Hallucinations and Illusions* (Eng. trans.), and articles "Hallucination," "Illusion" in Baldwin's *Dictionary*.

CHAPTER XV.

COMPARISON AND CONCEPTION.

When a teacher says—concerning a pupil of a type painfully familiar to all teachers—"I cannot make him *think*," the last word is used in a special sense, quite different from what it means when we say "I *think* so" (*i.e.*, I believe, but do not know with entire certainty), —and still more different from what it means when we vaguely describe all or any of the contents of our minds as "thoughts." It is this strict and proper sense of the word "think" which is now before us. From the psychological point of view, the fundamental process of thought is *conception;* and the nature of this process will mainly occupy us within the limits of the present work.

We may say that Conception is contrasted with Perception or Imagination in this, that whereas the two latter deal with the individual, in Conception we are thinking of what is *general—i.e.*, common to a whole group of individual cases. When I perceive a man, it is a concrete individual; when I explicitly recognise it, so as to be able to express the mental act by saying "it is a man," I have introduced a *general idea*,—I have *conceived* the object; when I say "what a wonderful thing Man is!" I am using the general idea without reference to any concrete case.

§ 1. *Comparison and conception.*—The process of Comparison is essential to Conception. We must now return to this topic (from ch. xii., § 4) and consider it from this point of view. The examples of Comparison given in that passage belong to the higher levels of mental life. We shall find the beginnings of Comparison and of Conception when we consider the nature of the contrast between two methods of solving some practical problem, to which we have already referred (p. 159). Professor Stout has given an excellent illustration.[1] "Let us suppose that a person sets himself to do one of those wire or cane puzzles which we owe to the ingenuity of the Hindoos. There are two modes of procedure open to him: he may work with his head or with his hands. Usually, if he be experienced, he mingles the two methods; but for our purpose it is necessary to place them in sharp contrast. If he is simply fumbling with his fingers, it sometimes happens that he hits on the right process by accident; but when this is so, he is unable to put the puzzle together again, or when it is put together for him, to do it the next time he tries. On this method it is also a frequent occurrence that he tries repeatedly ways of manipulation which have proved unsuccessful. Now, the characteristic feature of this method is the failure to compare with each other the various alternatives which present themselves. There is a transition from one attempt to another attempt; but the transition is not guided and controlled by *consideration of the points in which the new attempt differs from the old.* The systematic worker, on the other hand, tries to make clear to his mind beforehand whether the new trial will conduct him to the same difficulty which he had encountered in preceding trials; or, if he fails to see this beforehand, he takes notice of it when it occurs. . . . A simpler instance is afforded by any attempt to fix in our minds the position of an object, so that we may be able to find it again. In general, our perception of where a thing is, is a consequence of perceiving it at all; but wherever there is a motive for explicitly defining its whereabouts, so that we may be sure of remembering it, we find ourselves *comparing its position with that of other objects.* The thieves who visited Ali Baba's house saved themselves the trouble of comparison by putting a cross on the door; but when the captain himself came, he probably noted the position of each of the surrounding objects, and compared it with that of the house, fixing the points of agreement and difference."[1]

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[1] *Analytic Psychology*, vol. ii., ch. ix., § 1 (p. 169).

In all such cases, what happens? We distinguish two or more particular cases, and we notice (*a*) what is common to them and (*b*) the points of difference. Our special interest may lead us to emphasise *a* more than *b*, or *b* more than *a;* but both are present to the mind. Conception is the process of becoming aware of a common element connecting two or more different particulars; it is the act of thought which grasps the common element. The thought of the common element (distinguished from the various particular cases in which it appears, and identified as the same in all of them) is called a *concept* or *universal.* And here language comes in, as the indispensable aid to thought. Language is a system of *signs* for identifying concepts or universals; thus, the *meaning* of a *name* is the thought which it identifies.

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[1] Professor Lloyd Morgan (*Comparative Psychology*, ch. ii.) describes a series of experiments testing the capacity of a dog to learn by trial and error how to carry a stick through some railings. The experiments show that when the animal hit on the right way, or was shown it, he had no appreciation of the points in which it differed from the unsuccessful attempts. In such cases animals learn from experience very slowly, and only because the constant failure of the wrong attempts gradually decreases the probability of their renewal. The memory-images of the wrong methods become tinged with the pain of obstruction and failure: cf. pp. 159, 160.

The concept or universal is also called a "general idea" and again an "abstract idea." It seems useful to keep both these terms, but to make them correspond to an important difference between two kinds of universals. The "general idea" corresponds to the familiar "common noun" and "adjective" of grammar, and the "abstract idea" to the abstract noun. When we think of a class of things as connected by common qualities which each object in the class possesses, we form a "general idea"; when we think of these qualities apart from any objects possessing them, we form an "abstract idea"; thus, the word *man,* being the name of many beings having certain qualities, stands for a general idea; and the word *humanity*, being the name of those qualities by themselves, stands for an abstract idea. In the one case, we think of the common qualities and the concrete instances in which they appear, distinguishing the two; in the other case, we think of the common qualities by themselves.

§ 2. *Nominalism and conceptualism.*—This view of the concept or universal gave rise to a controversy between the upholders of two opposed theories,—*psychological nominalism* and *psychological conceptualism.*[1] The question is, as to what takes place in the mind when we form a concept. The nominalists deny that there is any such mental fact as a concept, apart from the name; the concept is the name and nothing more.

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[1] This psychological question is quite different from the philosophical question debated between "Nominalists" and "Realists"; see Baldwin's *Dictionary*, article "Realism, logical," vol. ii. pp. 422, 423.

The conceptualists say that there is a mental fact which is the *meaning* of the name.

The question may be thus stated: what is the process in consciousness when we use a general or abstract term?

The only difficulties in arriving at an answer are those which various writers have manufactured for themselves, through failing to distinguish between *concepts* and *mental images* (ch. xiv., § 2). Thus, Locke says: "General ideas are fictions and contrivances of the mind, that carry difficulty with them, and do not so easily offer themselves as we are apt to imagine. For example: does it not require some pains and skill to form the general idea of a *triangle?* For it must be neither oblique nor rectangle, neither equilateral, equicrural, nor scalenon; but all and none of these at once. In effect, it is something imperfect, that cannot exist; an idea wherein some parts of several different and inconsistent ideas are put together" (*Essay concerning Human Understanding*, bk. iv., ch. vii., § 9). If Locke meant that we can have a mental image of a triangle possessing no particular qualities, but all sorts of qualities which all sorts of triangles may have, then there is no doubt that such a mental picture is an impossibility. This conclusion was adopted by Berkeley (*Principles of Human Knowledge*, Introduction, §§ 12, 13, 16), who says that "a name becomes general by being made the sign, not of an abstract general idea, but of several particular ideas, any one of which it indifferently suggests to the mind." In other words, there is nothing but the common *name* and the various particulars to which it is applied.

What Berkeley goes on to say, however, opens up the way to a truer view. Taking the case of a geometrical proposition such as Euclid i. 32, he asks, "How can we know this to be true of all particular triangles, except we have first seen it demonstrated of the abstract idea[1] of a triangle which equally agrees to all?" His answer is as follows: "Though the idea [diagram] I have in view whilst I make the demonstration be, for instance, that of an isosceles rectangular triangle whose sides are of a determinate length, I may nevertheless be certain that it extends to all other rectilinear triangles, of what sort or bigness soever. And that because neither the right angle, nor the equality, nor the determinate length of the sides are at all concerned in the demonstration. It is true the diagram I have in view includes all these particulars, but then there is not the least mention made of them in the proof of the proposition. It is not said that the three angles are equal to two right angles, because one of them is a right angle, or because the sides comprehending it are of the same length. Which sufficiently shows that the right angle might have been oblique and the sides unequal, and for all that the demonstration have held good." And just as a demonstration, proved of one particular triangle, may hold good of all triangles, so "an idea which, considered in itself, is particular, becomes general by being made to represent or stand for all other particular ideas of the same sort." Berkeley then proceeds to make an important admission: "It must be acknowledged that a man may consider a figure merely as triangular, without attending to the particular qualities of the angles, or relations of the sides; so far he may 'abstract.' . . . In like manner we may consider 'Peter' so far forth as man, or so far forth as animal, . . . inasmuch as all that is perceived is not considered." The same conclusion is laid down by J. S. Mill: "General concepts we have, properly speaking, none; we have only complex ideas of objects in the concrete: but we are able to attend exclusively to certain parts of the concrete idea: and by that exclusive attention, we enable those parts to determine exclusively the course of our thoughts as subsequently called up by association; and are in a condition to carry on a train of meditation or reasoning relating to those parts only, exactly as if we were able to conceive them separately from the rest" (*Examination of Hamilton*, ch. xvii.)

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[1] By "abstract idea" he means what we have called a "general idea."

That something is wrong with this conclusion, is proved by the simple fact that thousands of persons carry on processes of conception and abstract thinking *with no mental images but those of the words* standing for the meanings of the thoughts; and if the *meaning*, in every case, is nothing but the *verbal image*, the laws of reasoning ought to be identical with the laws of grammar; which is obviously false.

It is perfectly true that, in conception, we cannot form an *image* of the general qualities by themselves, apart from any particular instance of them; we can imagine them only as forming part of one individual object. But when nominalists like Berkeley or Mill admit that we can fix attention on certain attributes to the exclusion of others, they have really given away their case. This exclusive attention to certain qualities implies that these are the qualities which we *mean;* we, as it were, draw a mental line round them. They are in a sense unified in the mind; for whatever be the image before our minds, we are conscious that we do not mean all the qualities, but only these. This consciousness of our meaning is what is signified by the concept;

this is the general or abstract idea. If Locke or any conceptualist asserted that we could *image* a concept, he asserted an impossibility; but it does not follow from this that there is nothing but the name. The concept is the consciousness of our meaning when we use a general or abstract term. The imagery which accompanies the use of a general term is quite irrelevant and is accidental. If I am thinking of *man*, it is irrelevant what kind of man is imaged in the mind—if there is any image at all beside the verbal one. The image contains much which is due merely to accidents of association.

We must now ask, How are the qualities, unified in the concept, regarded as "relevant"? The answer is, they are relevant to the special interest of the mind at the moment; and the other qualities, which are disregarded, are recognised and disregarded because they are recognised to be irrelevant to the mind's interest at the moment. Hence the formation of a concept is said to be the result of a process of "abstraction," and the qualities disregarded are said to be "abstracted from." We must know both the relevant and the irrelevant points. "A child may attend predominantly to the lustre of sunlit water, simply because it is the most impressive item within the context of its sense-experience at the moment. In this case there is no process of abstraction. But abstraction is present in a well-marked form, when a psychologist attends to the lustre of the water, because he is interested in analysing the perception of lustre in general, whatever may be the particular circumstances of its occurrence."

One point more must be mentioned in connection with the question at issue between nominalism and realism. Nominalists are not quite correct in saying that the image accompanying conception is that of a definite, concrete individual. Even our memory-image of an individual is never entirely definite; we do not always see the object under the same circumstances, hence the image is typical rather than individual,—definite in certain constant particulars, indefinite in other respects. What is called the "generic image" is a variety of memory-image which is not of an individual at all, but is produced by the repetition of percepts which resemble one another in certain respects and differ in others. They may produce a combined image, a vague shape in which the qualities common to the various percepts have reinforced each other, and the particular qualities have blurred each other. Such images sometimes accompany and even facilitate the process of conception; but they are not concepts. To suppose that they are, would be to reduce thought to a lower level even than that of verbal images,—to the level of indistinct perception.

§ 3. *Part played by language.*—The concept is in its very nature an abstraction, and as such cannot be imaged. It is an *ens rationis*,—the product of our mental activity grouping certain attributes together and imposing on them a name. This is well brought out by the German word *Begriff* = concept, which is opposed to the vaguer word *Vorstellung* = image. The latter term covers all that we can make a picture of in the mind; the generic image falls under the head of *Vorstellung*.

The rational activity of the mind is prominent in the formation of the concept. Images may be formed mechanically without any conscious effort at all. In order to get the concept, even after we have got the generic image, the will must go out and seize certain definite attributes and distinguish them from others.

Here we see the special importance of language in fixing these concepts. It has been well said that "language is the necessary ally of thought; words are the fortresses of thought." The fact that the concept cannot be imaged makes it necessary to have something to recall it by. The name, being a sensuous fact, affords a sense-basis necessary to be associated with the mental creation called the concept, in order that the latter may be permanently retained in memory and conveniently recalled.

The name is, so to speak, a "handle" for the thought. Other kinds of imagery—visual images in particular—may, sometimes and with some persons, serve as handles for thoughts; but the verbal image is most suitable and most frequent (see ch. xiv., § 2, pp. 401, 402). It would seem also that concepts may function in mental life, unaccompanied by images of any kind (see p. 404); but in the normal course of development of the child's mind, concepts begin to be formed by the aid of language.

The origin of language, in the history of the race, is a problem beyond the range of this book. But, if we assume a developed spoken language existing in the society into which the child is born, we can trace some of the principal steps by which language comes to play so great a part in the formation of concepts.

The child begins to use language before he reaches the level of conceptual thinking. The process of automatic recognition (ch. xii., § 3) involves a feeling of familiarity which tends to find expression not only in action but in word. The names are often spontaneously invented by the child. Professor Sully mentions a child using the sound *mum* as a name of eatables generally, and another the sound *appa* as a common name for various animals. Frequently, however, the name is suggested by some perceived quality of the object; thus, a child, known to the writer, was accustomed to call every railway train by the name *oo*, from the sound of the distant whistle; and a hen or any farmyard bird by the name *gluckalulu.* Imitation soon leads the child to the use of names employed by his elders; but he is always ready to extend the use of them to things resembling one another in whatever unimportant ways. These first words used by the child do not stand for general ideas; they merely serve to mark off and register common features of his experience. But as the capacity for perceiving and distinguishing external objects increases with the child's growing motor activities, and as the supply of names adopted and applied by imitation also increases, these objects fall into groups whose interest lies in their possessing common attributes, being thus separated from those whose interest lies in their special individual relations to the youthful personality, such as—father, mother, brother, sister, &c.; for these the names used are in the logical sense "singular."

The importance of the use of names in connection with class-groups has been excellently shown by Professor Sully.[1] "At first we find that the use of general names is confined to classes of objects having numerous points of similarity, and so easily representable in the pictorial form of the *generic image*, as "dog," "house," and the like. Here the name is not used with a clear consciousness of its general character or function. Yet the very application of one and the same name to successive percepts is an important aid to those processes of reflective comparison and selection of common features by which the apprehension of generality arises. To begin with, any use of a name to mark the result of an assimilative process serves to call attention to and to emphasise the existence of like features. Not only so, the name being applied to each of a series of percepts is a valuable means of recalling these together, and so furthering that extended process, the comparing of a number of things, which underlies generalisation. More than this, since the name from the beginning serves to emphasise and register the fact of likeness, it greatly facilitates the subsequent careful analysis and definition of the common features. Of special service here is the hearing of names applied by others to a variety of things, as when a multitude of unlike things are called "plants," and so on. Such announcement of likeness as yet undiscovered by the child serves, as we know, as a powerful stimulus to a comparative examination of the things, and thus urges the child on along the conceptual path. The greatest use of general names, however, in connection with general ideation or conception, is in definitely marking off and rendering permanent each new result of analysis and comparison. Thus, on reflecting on dogs, with a view to see in what exactly they do agree, in spite of their differences, and on gradually gaining clear consciousness of this, that, and the other characteristic feature of form and action, a child demarcates, and definitely registers these results of abstraction by the help of a name."

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[1] *Human Mind*, vol. i., ch. xi., § 23.

Thus, while the process of thought called Conception is prior to language, it could make no progress without embodying itself in language. "Hence the development of the general idea," says Sully again, "is a process largely dependent on the action of the social environment. Language is pre-eminently the invention and instrument of social life. It is the medium by which we communicate to one another our wishes, ideas, and so forth. In the early years of life the undeveloped intelligence of the child is continually stimulated in the way described above by the common use of general names. The results of ages of thought-processes embodied in the lives of educated men and women are thus brought to bear on the growing mind, and these constitute a main ingredient in the educational influence of the community upon the individual.[1] The profound and far-reaching influence of this medium of common word-embodied ideas is clearly seen in the arrest of intellectual development, where contact with the general mind, through language, is excluded, as in the case of neglected deaf-mutes, and, to a lesser degree, of those who from isolation of circumstances are withdrawn from the stimulating influence of the higher phases of thought as expressed in the language of educated persons."

In the context of the brief but excellent exposition which we have quoted, Mr Sully makes two observations which seem thoroughly unsatisfactory. (1) A name becomes a general sign, "inasmuch as it thrusts prominently forward, and so secures special attention to, certain definitely apprehended common class features" contained in a particular image (vol. ii. p. 423). As regards this statement, we must observe that while some people think vividly in images, others think mainly without them,—that is, with no mental imagery at all but that of the words which mean the thoughts. The use of words is learnt by imitation, and when a name begins to be used it is certainly in connection with the apprehension of common class features of images or percepts; but the name may be used as a general sign when every vestige of imagery has vanished from it. Mr Sully appears to recognise this, but he describes it as the tendency of verbal signs "to serve in themselves as *substitutes for* ideas (p. 425; italics ours); "just as in algebraic processes the symbols, x, y, &c., though representing something, are used for the moment as if they themselves were the ideas they signify; so in much of our ordinary reasoning it is sufficient to attend to the relations of the names themselves in order to carry out the process." This explanation leaves us with all the difficulties of nominalism still on our hands. The "relations of the names themselves" are determined by the laws of grammar. It is a familiar fact that propositions and reasonings which are grammatically correct may be all nonsense; if they are nonsense, it is because the relations—not of the words themselves, but of their meanings—have gone wrong.

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[1] Cf. what was said in ch. ii., § 5, above.

The truth is, that the "image" has reigned supreme in psychological theories for long enough. It almost seems as if psychologists had been ridden by a hardened prejudice or "fixed idea" that where we cannot point to a "sensation" or "image" in the mind, there is nothing at all. We have seen (ch. xii.) how this whole view breaks down in connection with *perception*, which is *not* a sensation with a cluster of images of past sensations; and perhaps the time is coming —owing to the work of Ward, Stout, and a few others— when it will no longer seem a psychological absurdity to say that imageless thought pervades our rational life.[1]

The subject of Comparison and Conception may be further studied in Stout,* *Manual*, bk. iv., ch. iv., v.; *Groundwork*,* ch. xii.; *Analytic Psychology*, vol. i., bk. i., ch. iv., §§ 2, 3, and vol. ii., ch. ix. (on Comparison, see also Sully,* vol. i., ch. xi., §§ 4-12); Ward, art. "Psychology," pp. 75, 76; James, *Principles*, vol. i. pp. 468, 473ff, and 508; vol. ii. p. 48 (attempt to explain the *meaning* of a thought as a function of the more "transitive" parts of consciousness, the "fringe" of relations which we feel surrounding the image; see also Stout, *An. Psych.*, vol. i., *loc. cit.*, § 4); Baldwin, *Mental Development in the Child and the Race*, ch. xi. Among older discussions we may mention: Berkeley, *Principles*, Introd., §§ 6-25, and §§ 97-100; Mill, *Examination of Hamilton*, ch. xvii.; Bain, *Mental and Moral Science*, bk. ii., ch. v.; and especially Lotze, *Logic* (Eng. tr.), vol. i., bk. i., ch. i. On "generic images," see Stout, *An. Psych.*, vol. ii., ch. ix., §§ 6, 7; Huxley, *Hume*, p. 94; Galton, *Human Faculty*, appendix on "Generic Images." Further, we may refer to the following articles (all of which are valuable) in Baldwin's *Dictionary*: "Abstract Idea," "Abstraction," "Conception," "Generalisation," "Generic Image," "General Concept," "Notion."

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[1] A recent writer in the *Journal of Philosophy, Psychology, and Scientific Methods*, argues on introspective grounds that thought contains elements which are wholly irreducible to sensory terms. He shows that even where there is imagery, it cannot be essential, because "it is often vague where the thought is focal [definite and intense], or irrelevant," or often mere "associative by-play." Each thought has a particular *meaning*, which, again, is not "a mere relation between an image and the object to which it refers" (vol. iii., No. 26; "Imageless Thought," by R. S. Woodworth).

On the connection between Thought and Language, see Stout*, *Manual* and *Groundwork*, as above; Lloyd Morgan,* *Psychology for Teachers*, ch. viii.; *Comparative Psychology*, ch. xv. Most books on the development of the child deal with the gradual unfolding of the generalising power through the aid of language: especially Preyer, *The Mind of the Child* (Eng. tr.); Perez, *First Three Years of Childhood*; Darwin, *Mind* (O.S.), vol. ii. pp. 285ff (notes on the development of his own child). On the practical "use and abuse" of words, see Locke, *Essay concerning Human Understanding*, bk. iii., ch. ix.ff; Mill, *Logic*, bk. iv., ch. iii.ff. Egger, *La Parole Intérieur*, deals with the part played by language in connection with general ideas (ch. v.ff). See also two valuable articles, "Language" and "Language function" in Baldwin's *Dictionary*.

The process of thinking, as it is usually expounded in works on Logic, is laid out in three stages, of which "Conception" is the first—"Judgment" (*i.e.*, any assertion or statement of fact) and "Reasoning" being respectively the second and third. This arrangement is no doubt convenient and indeed indispensable as a matter of exposition; but it must not be allowed to suggest that we have three different kinds of mental process which simply come after one another. In the formation of ideas, in judgment, in reasoning, we have not three separate processes, but a development or expansion of one and the same process.

What we wish here to emphasise in particular is that Conception and Judgment are not fundamentally distinct. Language began with sentence-words—that is, with words serving as sentences (statements, wishes, &c.) It is well known that children employ words at first in the same way. This is sufficient to show that Judgment (which cannot be verbally expressed in less than a complete sentence or sentence-word) and Conception begin together. They also act and react on one another. This can be at once understood when we consider what a Judgment really is. At bottom it is *a recognition of relation.* The automatic recognition, which constitutes the most elementary form of perception, is the germ from which Judgment grows, and is expressed in the first sentence-sounds (not mere reflex cries) uttered by the child; but Judgment, as a complete psychological fact, does not appear until an act of recognition is expressed in words (external or internal). Hence it is *an explicit recognition of relation* between two things, or between a thing and its quality,—a recognition which seeks its verbal expression by means of a distinct subject and predicate.[1] Now we have seen that it is by such explicit recognitions of likeness and difference—of unity in the midst of variety—that concepts are built up; and concepts formed by Judgments may themselves enter into and help to constitute more elaborate Judgments.

The treatment of the forms of Judgment and Reasoning would take us beyond the limits of this book. The student is referred to Welton,* *Logical Basis of Education;*

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[1] It has been truly said that even at the level of adult human life, "'we all carry out in connection with perception 'implicit' acts of judgment, which do not clothe themselves in language external or internal, as in determining the size or distance of an object, or its position in relation to a second object, in recognising a person as the same as one previously seen, and so forth." Still, we do not know, even in ourselves, whether we have clearly apprehended the relation or not, until we have explicitly expressed it in a judgment.

Bosanquet, *Essentials of Logic;* Sigwart, *Logic* (Eng. tr.), vol. i., part i., §§ 5-38; and for further references, to Mellone, *Introd. Text-book of Logic,* ch. xi. And we must not omit mention of Professor James' brilliant and suggestive chapter on "Reasoning," *Principles,* vol. ii., ch. xxii. The mention of works on Logic here suggests the question: What is the relation of the *logical* treatment of thought to the *psychological?* Before answering this question, we must remember that Psychology at the present day is approached from various points of view (ch. ii., above), and in particular from two fundamentally different points of view—one exemplified in the *Physiological Psychology* of Wundt and the writings of the school which he founded; another, in Stout's *Analytic Psychology*, or Ladd's *Psychology, Descriptive and Explanatory.* The former treatment of Psychology has no relation whatever to Logic; for it scarcely treats ideas as cognitive—it leaves out the fact of *knowledge* and its implications. The latter treatment deals elaborately with description and analysis of the intellectual processes; but it is interested in them only as *mental facts.* Logic is interested in them as exemplifying the *regulative* principles of thought. It dwells on these principles as types to which our thought must conform itself; and hence Logic can go beyond the actual facts of the intellectual activities of mind, and can formulate an ideal of knowledge, by which the worth—that is to say, the *truth*—of our present intellectual achievements may be judged.

CHAPTER XVI.

THE SELF.

As the acorn "tends" to grow into an oak, as the tadpole to turn into a frog, as the cub to become a lion, so in the human infant exists a "tendency" to grow into a man. But unless circumstances are favourable none of these tendencies will be carried out; and the more favourable the circumstances the more completely will they be carried out. Even in the most favourable circumstances we do not suppose it possible for any seed whatever to grow into the most perfect plant; no more do we suppose that any infant whatever, if placed in suitable environment, could grow into a Shakespeare or an Aristotle. The greater the complexity of the adult form to be attained, the greater is the variety possible in the standard attained. In man, as the most complex of beings, the variety of possible attainment reaches its height.

§ 1. *Personal identity.*—This idea of tendency involves the idea of process in time—*i.e.*, of change. We talk of the identity of the self, but if the self at any moment is simply the culmination of a process which has been going on up to that moment, then the identity belonging to the self cannot be an identity implying sameness. The identity is one of continuity;[1] each self passes imperceptibly into the next, the change being so gradual that it is rarely detected at the time; although a very great difference may be perceived if we compare ourselves as we were at fifteen with ourselves as we are at thirty. The latest self contains all the previous selves in the sense that their experiences are known by it and welded by it into its life. Even in cases where the experiences of the earlier selves are not known—as in the lost life of our childhood—we may still say that the present self contains the previous selves, because the effects of these experiences persist. "Our delight in the sunshine of the deep-bladed grass to-day might be no more than the faint perception of wearied souls, if it were not for the sunshine and the grass in the far-off years which still live in us, and transform our perception into love."[2] The present self is different from what it would have been had the past selves been different. "The past that is forgotten is not necessarily lost. In some form, by some method, we continue to profit by that experience, and it is more important to have had a good past than to be able to recall it."[3]

The sense of our personal identity is no doubt closely correlated with memory. But memory is the precondition of any mental life at all—even sensation, as we have seen, seems to demand the action of a summation of stimuli involving what has been called organic memory—so that we need not elaborate this point. It is patent to every one that the fact that the experiences of our past selves rise in us still, as it were, warm with the emotional fire which once surrounded them, is the fact on which we mainly base our claim to what we call personal identity. This memory of ours is not always true to the actual course of events. We sometimes invest our imaginations with so much emotional tone that we incorporate them as actual experiences into the life of the self. Thus it is not uncommon for children to assert positively that they were present at incidents that happened before they were born.

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[1] The continuity is obviously not a continuity of consciousness in time, for there are gaps in consciousness—*e.g.*, whenever sleep overtakes us. The self that wakes is the same as the self that goes to sleep, in that it has the same knowledge, the same interests, the same bodily appearance, &c.

[2] George Eliot.

[3] "Place of Mental Imagery and Memory among Mental Functions," by F. Kuhlmann, *Amer. Journ. of Psych.*, vol. xvi.

The sense of personal identity, then, involves at least the sense of continuity, and the warmth of appropriation which invests what we call our memories.

The more fundamental of these conditions is memory, for, so long as memory is intact or nearly so, the sense of personal identity can persist through very serious breaches of continuity. Thus if we lose ourselves when we are racing along through beautiful country in a motor-car, and wake to find ourselves in bed with a body full of pain and swathed in bandages, there is an absolute break in the continuity of consciousness,—our surroundings have altered in a way of which we can give no account, and our organic feelings have become such that we fail to recognise them as our own. But if memories—which we recognise as memories—come flowing into our mind, we consider that we are the same selves. Sudden conversions, the change in self-feeling consequent on a mental shock or that brought about by champagne or opium, are examples of breaches in continuity, but although in these cases people sometimes say, "I feel a different man," they never seriously mean, "I am a different self."

We have spoken above of "selves,"—of one self absorbing those which have gone before. The question then arises—Is there a succession of selves, or have we any reason for supposing there is one self which has a continuous existence through time?

Before we attempt to answer this question, however, we must make clear to ourselves exactly what the term self denotes.

§ 2. *Meaning of the term self.*—A very important part of a man's self is his idea of his body and of how it is clothed. If we believed that one of our limbs had been removed, even although we were suffering no actual pain or inconvenience from the fact, yet our self would undergo a change of a painful nature. In every forecast of the future we should be stopped short by the reflection that we could no longer count upon our body as we had been wont; and these stoppages in the course of thought would be just as disconcerting as the incapacity experienced in our active life. Rags and squalor lessen most men's self-respect; they bring about a shrinkage in the self; while, on the other hand, Mr Holmes, the London police court missionary, tells us he has seen more than one man find salvation in a well-made, nicely-fitting suit of clothes.

Again, these things form part of the self in the very important sense that they come to represent its activity. As a periwinkle builds its shell so that it cleaves to its pulpy organism more closely than a silken glove to the hand, so does man's mind mould his body to express his temperament, and in a wonderful way even his most fleeting thought. The eye brightens with joy, clouds with grief, hardens with anger; every muscle we possess lends itself automatically to express the life of the mind. Clothes in that they are separable and easily altered afford even more evident scope to activity—here, however, limited in some degree by our social instincts. In this sense, perhaps the most intimate and dearest part of the self is the work of our hands or of our brains. Who has not sympathised with poor Mrs Tulliver in her lament—"To think o' these cloths as I spun myself, and Job Haxey wove 'em, and brought the piece home on his back, as I remember standing at the door and seeing him come, before I ever thought o' marrying your father! And the pattern as I chose myself—and bleached so beautiful, and I marked 'em so as nobody ever saw such marking—they must cut the cloth to get it out, for it's a particular stitch. And they're all to be sold—and go into strange people's houses, and perhaps be cut with the knives and wore out before I'm dead."

Here, as on every other level of mental life, we find action and reaction between the self and the world. In and through its action on the world does the self develop. Manufactories, schools, armies, nations, are examples of organisms by means of which a man may express himself as he does through his own body. The desire for power is to some extent the instinct for self-expression; and as the power grows and with it the sense of responsibility to and for others, so does the self grow to keep pace with it. The more scope we have for self-expression the more self, as it were, do we find we have to express. All our possessions are valuable to us only because they give us this scope. Hence all that we call ours—what we have inherited no less than what we have made,—our land and gold, our house and furniture—goes to swell our sense of self. And these things, no less than what we have ourselves created, have on us a formative influence. Thus Tennyson's Lady Clare, brought up in the traditions of an ancient and honourable name, shook herself free from the stain of her birth by her uncompromising loyalty to those traditions. Beliefs of this nature, instilled into us from our childhood, become habits of thought; they may be ungrounded in fact, as was Tom Tulliver's belief in the stability of his father's fortune, but they are so inwoven in the fibres of our being that any violent alteration of them seems to change our very self.

And yet in all ages the man who reflects has cast these things out of himself. "When anything shall be reported to you which is of a nature to disturb, have this principle in readiness, that the news is about nothing which is within the power of your will. Can any man report to you that you have formed a bad opinion or had a bad desire? By no means. But perhaps he will report that some person is dead. What, then, is that to you? Or that your father is planning something or other. Against whom? Against your will? How can he? But is it against your poor body, against your little property? You are quite safe; it is not against you."[1] We form ourselves upon the world, and when we reach the stage of reflection—a stage which is of course not reached at all by many human beings—we reject the world, as the child, when he becomes a man, puts away childish things.

We have so far considered man as an individual, but it cannot have escaped the reader that whenever we come to consider any extensive human work we have to bring in his relations to his fellows. Indeed much of the value of our possessions to us is derived from the fact that they conduce to our importance in the eyes of others—to what has been called our *social self.* We know that any one whom we meet forms from our appearance, our conversation, our acts, a certain idea of us, and those whom we know well retain this idea as part of their mental furniture. In these ideas we take the greatest interest, and we have a desire, which may be exaggerated into a mania, that they should prosper—*i.e.*, that our friends should regard us with affection or even admiration; nor would we willingly do anything that we feel would justly lower their confidence in us. We try to live up to those ideas, and to some extent even mould ourselves upon them. "We are different with different friends; yet if we look closely we shall find that every such relation reposes on some particular apotheosis of oneself; with each friend, although we could not distinguish it in words from any other, we have at least one special reputation to preserve: and it is thus that we run, when mortified, to our friend or the woman that we love, not to hear ourselves called better, but to be better men in point of fact."[1] Again, we have an idea of our own selves, and when our conduct is inconsistent with this idea, then our self-feeling undergoes a change. This change may be either painful or pleasurable; we may yield to a sudden temptation, and shame or remorse may result; or in a crisis we may act with a promptitude and self-control of which we did not think ourselves capable. This idea is an intellectual representation of fact, effected perhaps in most of us by emotion, but one which may be more or less true. There is nothing necessarily moral about it; we may be pained because we show ourselves not so sharp as we thought we were, just as really as because we have shown ourselves less magnanimous than we thought we were. In a society of thieves he who lets himself be caught is the mortified man.

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[1] Epictetus.

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[1] R. L. Stevenson.

This idea of our self as we are must be distinguished from our ideal self—the self we desire to be. In cases where growth is still going on, the idea continually approaches the ideal, but rarely and momentarily reaches it. Yet the ideal must be reckoned as an important part of the self, for in a strong character it is the most powerful of the motor ideas, and so determines conduct. The formation and consolidation of the highest attainable ideal for the individual in that individual is the most important problem of the educator. A factor which grows with our growth and changes as we change, it is in its highest form necessarily a product of somewhat late development, and it rarely becomes so consolidated as to cease to be liable to be mastered by the overpowering needs of the organism.

We have already pointed out that the conflict which arises between our various desires or interests tends to arrange them in a sort of hierarchy, those which seem to us of less importance being subordinated to those which seem of more importance. The ideal self is composed of the ends implied in those desires, and hence is frequently self-contradictory until the hierarchy is formed and the less important sacrificed to the more important. Because of the limitations of our finite humanity, this often involves mutilation. A man who has a very wide circle of interests is often prevented from attaining the heights he might in any one pursuit, either because he lacks the clear-sightedness to see that mutilation is necessary, or because he lacks the courage to perform it.

It may be objected that not one of the things yet mentioned really *is* the self. They may be factors in it in the sense that they affect it, but it is in its own right something other and more than they. The very fact that these ideas of the self held by others, and even by oneself, may be true or false, implies that there exists a reality to which they more or less adequately correspond. This reality is to be found in what we have called psychological dispositions, the bodies of knowledge, the habits of thought, feeling, and action in their sum total,—these form the self. The expression or partial expression of these required by the conditions of the external world at the moment is to be found in consciousness, but they are in their entirety far wider than it. We have already pointed out (pp. 218, 225), with respect to the emotions, that a disposition of this kind, even although it can never in its entirety be in consciousness, is yet to be regarded as stronger than the most violent passion of a transient nature, because it has a more permanent effect upon our life—*i.e.*, it is actually a part of the self; whereas the transient emotion is merely a partial and inadequate expression of the self—an expression which may indeed be so inadequate as to be in effect a lie. Consciousness may be called the doorway of the mind or self; it is the way *out* and the way *in*, but it *never* opens so wide as to reveal the whole of the mind at once. This is an ultimate truth in human experience; it is obviously closely connected with the limitations which we found to be characteristic of the attention process. We are in the habit of regarding consciousness as the highest manifestation of mind; many philosophers have laid so much stress on it—owing to their definition of mind as a thinking (*i.e.*, conscious) substance—that they have tried to show that it never entirely ceases; that it persists faintly through the soundest sleep and the deepest trance. The evidence seems to us entirely against this theory; but, even if it were true, still we cannot but admit that the greater part of the mind or self is at any given moment not in consciousness; hence the question whether consciousness is or is not continuous in time cannot have anything to do with the question of whether the self is or is not continuous in time. When we come to take up this latter question we shall, however, have to touch once more on the relationship of consciousness to the self.

§ 3. *Development of the self.*—We have already incidentally seen something of the course of the development of the self. We have seen that we connect together our sight, touch, smell, and taste sensations in such a way as to form "things"; whereas in the case of such humble animals as the fish, the power of mental construction is so low that the smell of food is never conjoined with its appearance in such a way as to form the idea "worm"; each sensation maintains its distinct existence in its own right.[1] We have seen how, amidst the child's perceptual world, his own body holds a unique position,—because of the general body sense which is always present to consciousness, because of the phenomenon of "double touch," and because of the fact that anything coming into visible contact with the body always gives rise to sensation. As by aid of these sensations the bodily area is marked out, the child identifies himself with this particular percept whose vicissitudes affect him in such an altogether peculiar way. His own activity, which brings all parts of his body, so far as is physically possible, into contact with one another and with other things, and which in so doing floods him with kinæsthetic no less than with external sensations, is evidently the main agent in this learning process.

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[1] Cf. pp. 318ff.

By the association of the experiences of the divers senses the body becomes a "thing" in a world of "things," and because the body has an inner life which is the child's own, so is he apt to attribute an analogous psychic life to the other "things." The irresponsiveness of most things to his caresses or his violence prevents this supposed inner life taking very definite form: in the case of some children brought up in matter-of-fact households, possibly the belief scarcely ever plays a part of any importance in their world scheme. But there are perceived objects which respond very definitely to his actions; these are persons and animals. He may beat the table as long as he likes, but if he beats the cat it will run away or perhaps turn and scratch him. If he fondles his mother, he is himself caressed in turn; but if he fondles his toys, no responsive movements follow. By his mother or his nurse his desires are satisfied or thwarted; he is fed when hungry, warmed when cold, helped to walk and prevented from dabbling in the puddles dear to his soul. In such ways he becomes conscious of himself as one among a number of living beings whose acts form an inter-related whole, one supplementing and completing, furthering or thwarting the other.

But it is not only by this implicit reasoning process that the child comes to know himself as a member of a society. Into the abyss of time behind him stretches the far line of his ancestors, who yet speak in him and in whom his being is rooted. It is in virtue of his social qualities that man has established himself as lord of this earth; and long before he had arrived at a consciousness of self or of others as individuals, he was wont to *act* as a member of a community. The animals of a herd will trample the life out of one of their own kind that has been hurt, not from any ill-will to it, but simply because the cries of fear and pain and the smell of blood impel them to make a concerted attack on whatever seems most closely associated with those ill-omened sensations. It is to this habit of concerted action that the preservation of the weaker species has been due; and the purely instinctive and unreasoning social reactions which form part of the nature of childhood still play their part in teaching him, as self-consciousness arises, to know himself as one of a number whose nature and interest are one with his own.

At the stage that civilisation has now reached, knowledge has ceased to be the property of man and has become that of mankind. The whole cannot now be grasped by any one man; but, crystallised by means of literature into a permanent form, it remains accessible to all minds that have developed far enough to make any portion their own. It is the common heritage of us all, but only by our own effort can we enter into possession. In his first stumbling steps towards knowledge all the child's impulses play a part; but the most important part falls to imitation. An act performed by another will, as we have already seen, so dominate the consciousness of children at a certain age that they invariably copy it. Such sensori-motor acts Professor Stout ascribes to spontaneous imitation; but at an early age the child begins to perceive the end of the adult's act, and to adopt it as his own end. He then imitates the act with the view of attaining this end. This Professor Stout calls deliberate imitation. As the child grows, memory comes into play, and he imitates acts which he has seen in the past: thus he takes hold of your wrist and pretends to look at a watch as he has seen the doctor do; here he is imitating a copy in his own mind, and is thus entering on a higher phase of self-activity. At this level also spontaneous and deliberate imitation may be distinguished. Association may call up the idea in the child's mind; thus the sight of a doll in its cradle may revive the memory of the doctor's visit to baby, and this idea may pass straight into action in the normal way. Or the child, having found pleasure to result from the game, may watch the doctor with a view to playing his part more exactly. The idea is then deliberately set before himself as a copy, and he endeavours to mould himself upon it.

In this process of imitation the child not only adds to his ability to do, but he also increases his feeling-experience. When he gravely shakes his head over the sick doll, he enters in some faint degree into the feeling of the physician. But by far the greater part of his education in feeling comes to him by way of that direct spontaneous imitation which is part of his social heritage. When awe or reverence or fear is felt by the adults around him, the little child thrills in response, and in this way he shares an experience which would otherwise be far beyond him.

In human progress incomparably the most important factors are language and literature. The early use of language is due to spontaneous imitation. The mother makes sounds for her child, and the child imitates as nearly as he can. The sounds generally used, such as bow-wow, gee-gee, &c., are always made when the child's attention is directed to certain percepts; these percepts themselves, from acting as stimuli invariably along with the word-stimulus, come in time to call forth the appropriate sound from the child by themselves. This spontaneous naming of the object is greeted with approval, and the connection between name and object becomes fixed. Words come to be used to indicate desires by the same process of imitation coupled with memory; and the success attending this proceeding strengthens the connection formed between things or acts and words denoting them. The use of language being thus discovered, the child combines deliberate with spontaneous imitation. He demands names tirelessly, and practises his vocal organs in every delicate combination. By the help of language he assimilates in a few short years a large proportion of the knowledge which his predecessors have slowly wrung from reluctant nature. When Pythagoras discovered a new truth in geometry, he sacrificed an ox to the gods; now this precious bit of knowledge is the stale of every schoolboy. Literature enables every man to take his stand on the work of his predecessors, and begin where they left off. Hence civilised man has an incomparable advantage not only over the animals but over other men. It is this building up of the common knowledge of the race that has enabled him to rule his environment as efficiently as he does. And were science properly organised, were the questions which we are still putting to nature properly drafted, were the workers at each point in constant communication with each other, were all the progress made systematically collated and compared and rendered accessible, were there buildings fully equipped with apparatus affording every facility to trained workers and for the training of others, then the conquest of nature would proceed with far greater rapidity than it does. We are, it is true, slowly advancing towards this ideal, but its attainment is still far off.

Now all this knowledge of the nature of the world finds outward expression in railways, telegraphy, houses, furniture, pictures, sculpture, in all the infinitely various ways in which man seeks either to mould his environment to his desires or to express his own nature. The child grows up with these things forming part of his world; he could not himself make a steam-engine or build a bridge, but the power which these things confer on him is counted on in all his acts and thoughts; the individual self is expanded by its use of the collective work of mankind.

Again, in the individual self, knowledge exists as an organism; it forms part of a living, growing mind, and it can be healthily added to only by a process of growth, not by a process of accretion. From this fact spring two results: first, that only through activity of the self can knowledge be increased—a thesis which has already from other premisses been abundantly made plain; and second, that there is a continuity in knowledge—that what has been appropriated already determines what can be appropriated now. In illustration, think of a new Act of Parliament. Only the man who knows the Acts which already bear upon the persons affected, only the man who is intimately acquainted with many individual cases of their action, can properly estimate the scope and bearing of the new Act. It is the same with science: no one could understand the meaning of Ramsay's discovery of argon who was unacquainted with Mendeléeff's law of the elements;[1] to most people it was simply the separation of a distinctly uninteresting body from the rest of the atmosphere; to chemists it was a cope-stone for their intellectual construction of the universe. New discoveries are made by men who have assimilated to themselves the work which has already been done, through their grasp of its implications. In primitive times chance experiments may sometimes have been happy, but now fruitful experiments are not directed by chance, but spring from and presuppose a large body of knowledge already established. In the same way individual advances are made by the mind reaching out from the level already attained; all ideas as they enter consciousness are modified and transformed by the nature of the receiving mind. Thus children never receive ideas as they come from their teachers; could the mind of the teacher and the minds of the class all be laid open to our inspection when a lesson is going on, it would be a revelation in psychology. Indeed we may generalise this saying, and affirm that no one ever receives the thought of another as that other thinks it. It must have happened to all of us to read a book with the greatest enjoyment and profit, to feel that it has widened our horizon by raising us above our previous level, and on returning to it a few years later to find ourselves greatly disappointed, and unable to tell what we saw in it before. The reason of this is that we have actually taken from the book on first reading all it had to give us; we have since, by its help, grown past it, and hence find it now unproductive. The master books are those which are always above us, but which present something which can be taken hold of at every stage of development.

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[1] In 1869 Mendeléeff pointed out that if the chemical elements are arranged in the order of their atomic weights the same properties recur throughout the series. To make this law of periodicity evident among the elements then known, various gaps had to be left. It was prophesied that elements would be discovered which would fill these gaps, and which would have certain definite properties indicated by their position in the series. Argon is one of the elements thus foretold.

Most of our knowledge takes the form of a representation of the external world; and this knowledge we hold in the form of belief. Belief is the primitive state, and is limited only by the nature of the mind which prevents the entertainment of contradictories. Childhood tends to accept everything at its face value; it is only after the mind has been at work analysing and connecting that contradictions are discovered, and hypotheses evolved to make them disappear. To give an obvious instance: colour is supposed by children to be inherent in things themselves; light simply reveals what is already there. But different lights—*e.g.*, gaslight and daylight—show different colours, and how could this be if colour were actually in the object? New explanations must be advanced to meet these difficulties; and so sense phenomena in time come to be, as it were, supported on a mighty connected framework of hypotheses which render them consistent with one another. On these beliefs we act, and in so doing test them; if our expectations are not fulfilled, we remodel our beliefs. This process of testing and reconstituting continues to some extent throughout life; there is always what may be called a "fringe" of belief which we hold loosely, and which may be altered. As we grow older, however, the core of our belief—the part which has been tested and re-tested, and which is inwoven with all our habits of action—becomes such a fundamental part of the self that we are incapable of reconsidering it, and any new applicant which conflicts with this firmly established centre is instantaneously ejected from the mind.

With regard to inanimate nature, beliefs do not affect facts,—you may trust the heavens not to rain upon your picnic party, but they will do so all the same. But with respect to your social environment beliefs do affect facts. Belief in the kindness of your fellow-men will often beget kindness; belief in their selfishness will beget the vice which it affirms. Thus people who have different beliefs live in worlds which are different in point of fact. But as one disappointment will do more to overthrow than ten confirmations will do to strengthen belief, it is of great importance that children should never be harshly or unjustly treated, that so they may preserve that ready trust in the goodness of the world which tends to bring about its own fulfilment.

The self as thus conceived is a complex organism, finding a more or less adequate expression in consciousness and in action on the environment. The power of self-expression is not always justly proportioned to the nature of the self. The adolescent, for instance, often has surges of feeling and vague thought which he does not wholly understand, and which he is powerless to let forth in word or action. People who are dubbed cold and self-restrained are really often the victims of a similar inhibition; their emotive potential is higher, so that they do not "go off" so easily as their so-called more emotional brethren do.

This conception of the self accepts the principle of growth as fundamental, and with the fact of growth is correlated the possibility of unhealthy growth or disease.

§ 4. *Diseases of personality.* — Of late years much interest has been aroused by certain "psychological puzzles" which have been called "alternations of personality." Several cases of this kind are now described in medical and psychological literature. Perhaps the most complete and interesting examples are the case of V. Lois,[1] studied by Bourru and Burot (*Variations de la Personnalité*, 1888), and the case of "Miss Beauchamp,"[2] studied by Dr Morton Prince.

Lois had from childhood been a vagabond and a beggar. Arrested for theft, he was sent to the reformatory of Saint Urbain. One day on lifting a bundle of twigs he was terrified by the appearance of a viper. Falling ill as a consequence of this fright, he was transferred to the asylum of Bonneval, suffering from paralysis of the lower limbs. Here his character was good, he was grateful and docile; he was taught tailoring, and learned to sew pretty well. After about a year he had a severe fit of hysteria, on recovery from which he was found to have forgotten all his Bonneval life, and to believe himself still at Saint Urbain. He had no knowledge of the doctors and nurses, and his paralysis had disappeared. His disposition was completely changed; he was now quarrelsome, gluttonous, and impolite; he remembered being frightened by a serpent "the other day," and had no idea that more than a year had passed since that event.

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[1] See Ribot's *Diseases of Personality*, where full extracts are given. Eng. trans., pp. 72-81.

[2] *The Disassociation of a Personality*, by Morton Prince, M.D., Professor of Diseases of the Nervous System in Tufts College Medical School; Physician for Diseases of the Nervous System, Boston City Hospital, U.S.A.

Later the youth was dismissed from the asylum, and after leading a wandering life for some time, was taken to Bicêtre, whence he escaped and enlisted in the Marine Corps at Rochefort. Later still he came under the care of Messrs Bourru and Burot, who, by the help of physical methods of transference (magnetism, electricity, &c.), obtained in him six different states, each characterised by a special physical condition and a special memory.

In his ordinary state he now suffered from hemiplegia[1] and hemianæsthesia[1] of the right side. He was talkative, arrogant, rude. He was unable to write owing to the paralysis of his right hand. His memory was very limited, his childhood, his sojourn at Saint Urbain, and the first part of his stay at Bonneval being forgotten. The second state was brought about by the application of steel to the right arm. It is characterised by paralysis of the whole of the left side, with hemianæsthesia. He is now at Bicêtre; his age is twenty-one; his expression is gentle, his bearing respectful. He never came to Rochefort, and never heard of the Marine Corps. He has very little memory of his earlier life. In the third state there is paralysis of the left limbs, with general hemianæsthesia. The patient's character, language, physiognomy are like those of the second state, but he now believes himself only nineteen years old, hence his memory is more limited. In the fourth state he suffers from paralysis in both the lower limbs; he believes himself at Bonneval, and knows only two places, Bonneval and Saint Urbain; he has forgotten how to read and write, but sews like one long in the business. In the fifth state he has neither paralysis nor anæsthesia; he can read well and write fairly; he is fourteen years of age; his memory is arrested at the viper incident, the mention of which brings on an attack of hystero-epilepsy. The sixth state is in physical conditions like the fifth. Lois is now twenty-two; he reads well, writes passably, but has never been a tailor, and does not know how to sew. His memory embraces his whole life, except the times when he was afflicted with paraplegia at Saint-Urbain and Bonneval.

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[1] See Physiological Glossary.

By hypnotic suggestion the psychic states were then induced directly, and it was found that the bodily states that accompanied them were in each case reproduced. Thus if Lois is commanded to awake at Bonneval when he was a tailor, he awakes with paralysis and insensibility in the lower limbs.

"Miss Beauchamp's" case is briefly as follows.[1] Dr Prince was consulted by a lady who seemed to him a neurasthenic of extreme type, and whom he treated, after ordinary remedies had failed, by hypnotic suggestion. After a time in hypnosis a second self appeared, who spoke of the waking personality as "she," had a supreme contempt for her and her "moonings," claimed an independent and coexisting consciousness for herself, and dubbed herself "Sally." Sally knew the thoughts and actions of the waking self—henceforward called B I,—but B I was for long ignorant of Sally's very existence. Sally at first appeared only in hypnosis, but after a time she succeeded in gaining possession of the waking body, and thereafter the two personalities alternated, much to the consternation of B I, who believed that Sally's deeds were done by herself when she had fallen into a trance. One day Dr Prince was summoned to see B I at her own house. He found her evidently suffering from mental strain, and as usual extremely reticent. Very shortly, however, "an extraordinary change seemed to come over her. She appeared natural, tranquil in mind and body, and sociable. All nervousness and signs of fatigue ceased. She . . . chatted pleasantly; in fact, seemed a new character, healthy-minded, and with every bit of reserve gone. I had never seen her so natural and sociably disposed." After a few minutes the doctor discovered that this was really another personality, and thereafter B IV, as she is called, shared the body with the other two. Neither B IV nor B I knew anything of the thoughts or actions of the other, but the memories of both were identical up to a point in Miss Beauchamp's life six years previously; B IV knew nothing of what had happened during these six years, nor had she any of the intellectual accomplishments which B I had acquired during that time. Thanks to the apparent healthy-mindedness of B IV, Dr Prince was for a time of opinion that she was the rightful owner of the body, and he directed his efforts towards maintaining her in possession. Finally, he came to the conclusion that neither B IV nor B I was a complete personality, but that the real Miss Beauchamp consisted of a fusion of the two, and he successfully directed his treatment towards bringing about this fusion. "Since her coming," says Dr Prince, "the real Miss Beauchamp has talked with me many an hour over her case, and about her life. . . . She has told me frankly about herself, her points of view, her attitude of mind, her feelings and emotions when she was B I, which as B I she never would divulge. She speaks equally freely about herself as B IV. These differences of state seem to her very largely differences of moods. She regrets them, but does not attempt to excuse them, because, as she says, 'after all, it is always myself.' Of Sally, her life and doings, she knows nothing except indirectly. Of this part of her mental life she has no more memory than has B I or B IV."

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[1] For an admirable account of this interesting case see *The Contemporary Review*, Feb. 1907.

Such cases as these bring into sharp prominence the complexity of the nature of the self. The gaps in the memory, and the extraordinary variation in the bodily state of the different personalities, show that we have here something which far surpasses any normal change of "mood." But it is doubtless to changes of "mood" that we must look, if we wish to find in normal life any suggestion of an explanation for the puzzling and weird phenomena just described.

We have seen (ch. viii., §§ 1-3) that besides the special sensations which give us knowledge of the external world, we have a general body sense which gives tone to our personality, and which in fœtal life probably constitutes the whole of it. Into this cœnæsthesis, as this general body sense is termed, special sensations are received, and they frequently form with it strong automatic connections (cf. example on p. 200). Although in general this cœnæsthesis does not occupy any prominent place in consciousness, yet on occasion it colours our experience in such a way as to force itself on our attention. Apart from such extreme cases of alteration in it as those described on p. 198, most people are aware at times of what we may call an exuberance of vitality; they feel themselves more than usually able to cope with their daily experience, their intelligence seems quicker, their energy more than equal to every demand; life has a greater zest than usual, small annoyances cease to annoy, pleasures are more keenly felt. At the opposite extreme we have seasons of depression for which there is nothing in our surroundings to account; the real world seems to recede from us; our pursuits lose their worth. In some people these extremes alternate with more or less regularity, and this striking difference in the cœnæsthesis makes them appear to themselves as well as to others of unstable character.

By many authorities this general body sense is regarded as the nucleus of personality, and to an alteration in it are attributed the most serious disorders of the self. Thus Professor Ribot arranges the diseases of personality in three groups, basing his classification on the amount of organic alteration,[1] thus:—

1. Total alteration of the feeling of the body, which causes new modes of feeling, perceiving, thinking, and so produces a new memory. The memory of the former life may to some extent persist, but that life is felt as

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[1] *The Diseases of Personality*, Ribot (Eng. trans.), pp. 133-137.

alien—as having been experienced by some one else. For example: "A soldier believed himself dead since the battle of Austerlitz, at which he had been severely wounded. When asked about his condition, he would reply, 'You want to know how old Lambert is? He is dead; he was carried off by a cannon-ball. What you see here is not he, but a poor machine that they have made, in imitation of him; you ought to ask them to make another.' In speaking of himself he never said 'I,' but 'that thing.' His skin was insensible, and often he would fall into a state of complete insensibility and immobility, lasting several days." (Ribot, p. 32.)

2. Alternations of personality, of which striking examples have already been given. With reference to these cases, Professor Ribot puts forth the hypothesis that "in these patients who are usually hysterical—that is, highly unstable—along with the secondary variations, two distinct *habitus* in the physical life exist, each of which is the basis of a separate psychic organisation."

3. The substitution of personality. Under this heading are included all cases of people believing their condition to be changed, as when a man thinks he is a woman, or a beggar believes himself a millionaire. This form of disorder "proceeds from the brain, not from the lowest depths of the organism; and is rather a local than a general disorder—the hypertrophy of a fixed idea, rendering impossible the co-ordination necessary for the normal life of the mind." It is "not, as in the two preceding groups, caused and supported by a profound modification of the feeling of the body, carrying with it a complete transformation of the person."

For another classification of the "mutations of the self," together with a number of very interesting examples, see James's *Principles*, pp. 373-401.

At present such classifications are at best only tentative owing to the fragmentary condition of our knowledge of the nature of the self. The emphasis laid by most writers on organic conditions, and particularly on cœnæsthesis, may be necessary for the present state of our knowledge, but, as we have tried to show in chap. v., the ultimate stress cannot possibly fall on the physical side. We may, it is true, image such phenomena as "double" or alternating consciousness as a separation of one set of organised brain tracks from another; but by what fissure or barrier the two sets are thus thrown out of gear we do not know. On the mental side the phenomenon in a small way is common enough: thus the presence of strangers often brings about an inhibition which prevents our "being ourselves," as we put it. Doubtless this has a concomitant physical aspect in brain change; our point at present merely is that the mental side is more intelligible and actually better understood than the physical. Even the change in cœnæsthesis is a mental change just as much as is the hypertrophy of a fixed idea. The difference is only that the former affects consciousness, and particularly the focus of consciousness, in a less striking and—if the figure may be pardoned—a less tangible way than the latter. Changes in the organism are of interest and importance only because they are symbols of psychic changes. Our business is to get as clear an idea as possible of the nature and causes of these unhealthy alterations under both their aspects, but we must never be misled into supposing that organic disorders can, as such, explain or account for mental disorders.

§ 5. *Relation of consciousness to the self; continuity of the self in time.*—We have already separated the question of the continuity of the self in time from that of the continuity of consciousness in time. We are not disposed to maintain that consciousness is continuous. It is at all events perfectly evident that much of our intellectual and emotional nature is for long stretches of time non-existent, so far as consciousness is concerned. Yet, when called upon, it readily manifests itself directly in consciousness and indirectly by guiding our actions. Consciousness, it seems to us, must for the present be regarded as an instrument in the development of the individual, acting at his point of contact with the environment, and summoning thither all his relevant resources. Much of the perplexity of the early psychologists with regard to this question of the relation of consciousness to the self arose from their assumption that the "soul" is a "simple" substance. Now, nothing seems to us to be more clearly indicated by the whole story of race evolution than that the "soul" of man is infinitely, unspeakably complex. Nor is there any reason to suppose that his consciousness, any more than his self, as a whole, represents the highest possible type of such existence. It is, indeed, perfectly conceivable that the goal towards which we—whether as a race or as individuals—are tending may be a more all-embracing consciousness,—a consciousness in comparison with which that which we at present enjoy may be as the merest flicker of the Will-o'-the-wisp to the full radiance of the sun. But, leaving such speculations aside, we must not in the meantime lay too much stress on the flicker of consciousness we possess, which in its irregularity and its narrowness is palpably inadequate to the self as a whole.

Setting aside the question of consciousness, then, let us turn to the wider question of the continuity of the self. Professor James maintains that for the psychologist the supposition that there exist individual selves having continuous existence through time is altogether unnecessary. All the phenomena of his science can be accounted for by admitting the existence of certain "streams of thought" or "subjective life." The present thought is not identical with that which is just past, but it, as it were, inherits and possesses it and through it all previous thoughts, which have each as they faded been appropriated by the newly arising thought. The gaps in the continuity of the stream caused by sleep or other periods of unconsciousness might seem to be an insurmountable obstacle to this theory. These Professor James deals with thus: "When Paul and Peter wake up in the same bed, and recognise that they have been asleep, each one of them mentally reaches back and makes connection with but *one* of the two streams of thought which were broken by the sleeping hours. As the current of an electrode buried in the ground unerringly finds its way to its own similarly buried mate, across no matter how much intervening earth, so Peter's present instantly finds out Peter's past, and never by mistake knits itself on to that of Paul. Paul's thought in turn is as little liable to go astray. The past thought of Peter is appropriated by the present Peter alone. He may have a *knowledge*, and a correct one too, of what Paul's last drowsy states of mind were as he sank into sleep, but it is an entirely different sort of knowledge from that which he has of his own states. He *remembers* his own states, whilst he only conceives Paul's. Remembrance is like direct feeling,—its object is suffused with a warmth and intimacy to which no object of mere conception ever attains. This quality of warmth and intimacy and immediacy is what Peter's present thought also possesses for itself. So sure as this present is me, is mine, it says, so sure is anything else that comes with the same warmth and intimacy and immediacy, me and mine. . . . This community of self is what the time-gap cannot break in twain, and is why a present thought, although not ignorant of the time-gap, can still regard itself as continuous with certain chosen portions of the past."

Now, although psychology may, for many purposes, with advantage limit herself to the study of the stream of thought as such without scrutinising its implications, yet the supposition that the existence of such a stream does not involve of itself the continuous existence of some entity is entirely unintelligible. If consciousness coincided in extent with the self, and if there were no time-gaps, the theory might present a certain plausibility. As things are, each time that we "rack our brains" for a piece of information which is not now in consciousness, but which we know we can bring there, we demonstrate its inadequacy. For this thought that we search for is not "warm," for as thought it does not at present exist. The present thought has never been in contact with it, so how can it even know of it? Professor James's theory really assumes the continuous existence in some form of the past of both Peter and Paul, just as his illustration supposes the actual existence of the second electrode before the current succeeds in reaching it. No theory of the self will ever be intelligible in psychology which does not openly or tacitly assume the continuous existence of the past, and this continuous existence of the past is simply what we mean when we use the term "psychological dispositions."

With the frank rejection of the old theory of the soul as a simple substance and the acceptance of a soul of infinite complexity, many of the traditional difficulties of philosophy vanish. The self is not a unity; it is full of contradictions, of incompatible desires, of antipathetic tendencies, of feelings irreconcilable one with the other. But its life is a journey towards unification—towards the establishment of an orderly hierarchy. In the individual no less than in the race is there a continual progress from the lower towards the higher; a cutting adrift from the life of the senses to enter into that of the intelligence and the higher emotions. Nor must we complain because failure is possible,—but for the possibility of failure the drama would lack reality. It remains for ever a hope, an aspiration, that he who is baffled and thrown out of the contest in the here and now, may fall to rise, and find the fulfilment of his being in ways which still transcend even the imagination of man.

The following are some important references for the subjects dealt with in the preceding chapter: Sully,* *Human Mind*, vol. ii., ch. xix. (Concrete Individuality and pathological States); Stout,* *Manual*, bk. iv., ch. vii. (Self as ideal Construction), and *Groundwork*,* ch. xiv. (Self and World as ideal Construction); James, *Principles*, vol. i., ch. x.; Baldwin, *Social and Ethical Interpretations*, and *Mental Development in the Child and the Race;* Lotze, *Metaphysics* (Eng. tr.), vol. i., bk. i., ch. vii., vol. ii., bk. iii., ch. i.; and articles "Personal Identity," "Personality, disorders of," "Self," and "Introjection," in Baldwin's *Dictionary*.

On Imitation, see Stout,* *Manual*, bk. iii. (i.), ch. ii.; Lloyd Morgan, *Habit and Instinct*, ch. viii.; Baldwin, *Mental Development*, ch. ix.ff.

On Belief, see Bain,* *Mental and Moral Science*, bk. iv. (The Will), ch. viii., and Appendix, p. 100 (in the latter passage Bain modifies the earlier view, which went too far towards the sheer identification of Belief and Will); Stout,* *Manual*, bk. iv., ch. viii.; Welton,* *Logical Basis of Education*, ch. i., § 4. Our account of the Perception of Reality (ch. xii., § 6, above) is an illustration of the formation of a Belief through *motor adaptation.* For fuller exposition of Stout's view see his *Analytic Psychology*, vol. ii., bk. ii., ch. xi. (also vol. i., bk. i., ch. v., on "Judgment"). Bain's earlier view is maintained in *Emotions and Will*, under heading "Belief." James's fine chapter, *Principles*, vol. ii., ch. xxi., should on no account be omitted. For a critical account of J. H. Newman's theory of Belief—which is of much psychological interest—see Melione, *Leaders of Religious Thought*, ch. iii.

The conception of the Self as a continuous self-organising growth, acting and reacting on an environment social and physical, is in harmony with views of existence which experience is compelling thinkers to adopt. The old *static* view of existence is disappearing, —the view that the real is distinguished from the phenomenal by being a realm of eternal necessities, of unchanging essences, of absolute meanings.

In place of the static view, we have now *dynamic* views of the real, and the predominance of such conceptions as those of purpose and function. These conceptions have, in particular, transformed our whole view of mental life, which is regarded as a process not only of activity but of productivity—if we may use the term: an unceasing process of producing from within new modes of thinking, feeling, and willing. The principle may be stated thus: consciousness is ever striving after a fuller realisation of its life; the essential nature of mind consists in its creative functions, which are inexhaustible.

PHYSIOLOGICAL GLOSSARY.

Central Nervous System.—The Cerebro-spinal Axis—*i.e.*, the Brain and Spinal Cord. It is called central in distinction from the "peripheral" nervous system constituted by the nerves (cerebro-spinal and sympathetic) distributed throughout the body.

Cerebro-Spinal Nerves.—Nerves which are connected at one end with the Brain and Spinal Cord, and at the other break up into branches which terminate in the skin, muscles, and other structures of the body. They are of two varieties: (*a*) Sensory or Afferent, along which the nervous current passes inward to the spinal cord or brain; and (*b*) Motor or Efferent, along which the current passes outward to the muscles.

Sympathetic Nerves.—Nerves which on the one hand are connected with little masses of nervous substance called ganglia, and on the other are distributed to the viscera and blood-vessels. The principal ganglia are arranged in two chains, one on each side of the spinal column. Branches of communication pass between the sympathetic system and the cerebro-spinal. The sympathetic nerves are the nerves of organic sensation (cf. p. 187ff.)

Cerebrum.—The mass of nervous matter occupying the upper portion of the skull. It is divided into two hemispheres, which are connected by nerve fibres. The external layer is termed the Cortex or *grey matter* of the cerebrum, and is thought to be exclusively the organ of consciousness.

Neurone.—The unit of the nervous system, consisting of a nucleated mass of protoplasm termed the cell-body or nerve-cell, and the protoplasmic processes continuous with the cell-body. Many nerve-cells have a number of short finely branching processes, and a single long process, called the axis cylinder or axon, which may reach a length of three or four feet. The cerebro-spinal nerves consist of bundles of fine nerve-fibres, bound together by connective tissue.

The great majority of nerve fibres consist of an axis cylinder process, surrounded by two protective sheaths.

Neurone Doctrine.—The doctrine according to which the Nervous System is built up of separate neurones between which there is no protoplasmic continuity. This theory is opposed by another which holds that the nervous network is continuous. The difficulty of microscopic investigation of the supposed junctions between neurones is extreme, so that our knowledge of them is still very imperfect.

Brain-Centre.—A number of nerve-cells which act together for the performance of some special function.

Pineal Gland.—An internal part of the brain about the size of a pea. It is not composed of nervous matter, but is now regarded by embryologists as the representative of a third eye which has fallen into disuse. It occurs singly in a part of the brain where the organs are otherwise duplicated; hence the importance attached to it by Descartes.

Reflex Arc.—The nervous mechanism necessary for producing adaptive movement—consisting of a sensory nerve, a motor nerve, and the nerve-cells mediating between them. In the case of pure reflex movements, the mediating cells are situated in the spinal cord or basal ganglia of the brain, and the nervous current passes round this single arc. These cells form junctions with the axons of neurones, the cells of which are situated in the sensori-motor area of the Cortex, and this double arch is termed a sensori-motor arc of the second level. In this book the arcs of the first level (the single arches) are termed reflex arcs simply, the arcs of the second level (the double arches) sensori-motor arcs.

Reaction Time.—The time taken to react on a stimulus. Simple reaction time is the time taken to give a definite response to a definite stimulus, both of which are known beforehand. Hence it is really the time required for the nervous stimulus to traverse a sensori-motor arc, usually of the second level. This time varies from one to three tenths of a second.

Hemi-Anæsthesia.—Lack of feeling in one lateral half of the body.

Hemiplegia.—Paralysis of one lateral half of the body.

Paraplegia.—Paralysis of the lower limbs.

INDEX.

Abnormal Psychology, 21.
Abstract term, 62, 67, 211.
  idea, 426, 430.
  or simple condition, 99.
Accommodation, monocular, 297, 349.
  binocular, 300-1, 350.
Action (see *Ideo-motor*, *Sensori-motor*, *Reflex*).
  tendency of Ideas to pass into (see *Ideo-motor*).
  importance of, 100.
  types of, 104.
  voluntary, 104, 105ff., 111-12, 118, 121, 132-3.
  non-voluntary, 104, 116.
  volitional, 104, 115.
  unvolitional, 104.
  spontaneous, 104.
  involuntary, 104, 115, 118-20.
  as Choice, 104-6.
  as Routine, 107.
  social, 450-1.
Active touch, 333.
Activity, 54, 60ff., 175ff., 258 (see *Conation*).
  as Tendency, 61, 183-4, 270.
  physiological, 182.
  mental, 183.
  intensity of, 174, 180, 184.
  as feeling-prompted, 259, 332-3.
  intellectual, 265ff. (see *Knowing*, *Knowledge*).
  intellectual, and feeling, 266.
  intellectual, Martineau on, 266.
  and Perception, 330-2.
  and Self, 443-5, 454.
  and bodily Self, 449-50.
Activity-experience, 64-5, 183-4.
  Stout on, 64, 183-4.
  Münsterberg on, 61, 64.
  Bain on, 64.
  James on, 64.
  Sully on, 278.
Adaptation to varying conditions, 52-3, 159 (see *Learning*).
  and Perception, 331-2.
Æsthetic feelings, 271.
  Bain on, 271-2.
  conditions of, 272-5.
  and Association, 275-6.
Affection, technical term, 67.
After-sensation, 306, 367, 406, 413.
After-image, see *After-sensation.*
Alimentary canal, feelings connected with, 193.
Alterations of personality, 35-6, 388, 457-63.
Amnesias, 360, 387-9.
Analysis, psychological, 7 (see *Introspection*).
Analytic Psychology, 20.
Anger, animal, 239.
  at different levels, 239-41.
  Stout on, 240.
  Bain on, 241.
Anthropology, 26.
Aphasia, 79, 389.
Appetite, 140.
  Stout and Baldwin on, 140.
Assimilation and Recognition, 318, 323.
  Sully on, 328.
Association and Æsthetic Feeling, 275-6.

Association, 320, 324-5, 390, 394-5, 452.
  Laws of, 366ff.
  Sully on, 390.
  Stout on, 390.
Associational theory of Mind, 35, 36.
Attention, degrees of, 56, 130.
  as activity, 63, 137, 316.
  Ward on, 64, 137.
  and Interest, 126-7, 316-17, 321.
  sensorial and intellectual, 131.
  oscillation of, 131.
  span of, 131-2.
  unity of, 132-3.
  volitional, 132-3.
  James on, 133.
  spontaneous, 134.
  immediate, 134-5.
  derived, 134-5.
  raises threshold, 135.
  shortens reaction-time, 135-6.
  as mental preparation, 136-7.
  Bradley on, 137.
  not co-extensive with mental life, 137.
  training of, 166.
  and sense-training, 167.
  not muscular innervation, 177-82.
  to visual imagery, 178.
  relation to eye-movements, 178.
  to verbal imagery, 178-9.
  to ideas, 168, 180.
  and feeling, 270.
  as selective, 316-17, 321.
"Automatic, primarily," 123-4, 161.
"Automatic, secondarily," 124.
Automatic assimilation, 318, 323, 432, 438 (see *Familiarity*).
Aversion, 138.
  due to obstructed process, 139, 263-4.

"Bipartite" division of mind, 53-4.
  Brentano on, 59.
Blind spot, retinal, 298.
Bodily organism, complexity of, 187.
  dependence of mental functions on, 29.
  perception of, 332-4.
  perception of, by touch, 333, 345.
  perception of, by sight, 334.
  as Self, 333-4, 449.
  and external Objects, 334.
Brain and Mind, 73ff.
  mechanical theory of, 77-8, 83.
  mechanical theory untenable, 91-3.
Brain-function, localisation of, 78, 389.

Canals, semicircular, 291-2.
Child Psychology, 25.
Choice of End and of Means, 105.
  influences Character, 106.
  of Means, does not require complete Volition, 108.
Classification, when inapplicable to mental facts, 55.
  of Emotions, 235.
Cochlea, 291-2.
Cœnæsthesis, 190, 462, 464 (see *Feeling, vital*).
Coexistence, spatial, 338, 341.
  mental, 55, 71, 351-2.
Cognition, 54, 69, 70 (see *Knowing*).
Colour-associations, 405.
Colours, 302-5.
  saturation of, 304.
  intensity of, 305.
"Combination, Law of," 229.
Comparative Psychology, 26.
Comparison, 326, 328, 424.
  and association, 327.
Complementary Image, 367-8, 405, 407.
Complex or Concrete, 99.
Complex volition, 170ff.
Conation, 54, 60-4, 175ff., 258 (see *Activity*).
  relation to Innervation, 175-6.
  as felt tendency, 64, 183-4.
  end of, 258, 260.
  end-state of, 258, 260.
  and Feeling, 259ff.
  and Feeling, Stout on, 261-2, 321.
  as continuous, 320-1.
Concept and verbal Image, 404, 429.
Conception, 72, 423ff.
  and Perception, 423.
  and Imagination, 423.
  and Comparison, 424, 438.
  imageless, 400-1, 432, 436.
Conceptual thinking, 427-31.
  physiological basis of, 403-4.
Conceptualism, 426-31.
  Locke on, 427.
  Berkeley on, 427-9.
  Mill on, 429.

Conditioned reflexes, 144-5.
"Conditions" of mental facts, 8.
  antecedent, 25, 229.
Conflict, inner, 112, 116-17.
  of Desires, 171.
  of Selves, 173.
Conscience, 251ff.
  beginnings of, 171.
  ethical elements in, 252.
  social factor in, 252.
  other elements in, 253.
  relation of ethical to other elements, 254.
Consciousness, 6, 469.
  degrees of, 6, 40.
  "states" of, 6.
  continuity of, 34, 464-5, 466-7.
  apparent interruptions in, 35, 448-9.
  abnormal interruptions in, 35.
  Höffding on, 36.
  Mill on, 36.
  focus and margin of, 40, 41, 132.
  field of, 41.
  threshold of, 43.
  mechanical theory of, 84.
  mechanical theory untenable, 85-6.
  as fundamental, 88.
  mechanical aspects of, 89, 90, 317.
  and Self, 448-9, 457, 464-5.
Conservation, see *Energy*.
Conservative Habits, 125.
Construction, rational, 164, 384, 419-21, 422.
Contiguity, Law of, 369.
Continuity of Consciousness, 34-5.
  of the Self, 465-7.
Contradiction, feeling-tone of, 269.
Convergence, binocular, 300-1, 350.
Cramming, 371, 387.
Cramp, internal feeling, 192.
Curiosity, 267-8.

Deaf-mutes, 22.
Decision or Determination, 100 (see *Voluntary*).
Deliberation, 107-8, 141.
Description of mental facts, 7.
Desire, as vague need, 138.
  as felt tendency, 138.
  not always for pleasure, 139.
  involving idea of End, 141.
  Ward on, 141.
  Green on, 141.
  early forms of, 169.
  hierarchy of, 171, 447.
  and Feeling, 263-4.
  Ribot on, 278.
  Sully on, 278.
  and Memory, 385.
  and Perception, 385.
Despair, emotion of, 239.
Development, 23-4, 226, 229.
  different Levels of, 71.
  of mental processes, 25.
  of Emotion, 226-30.
  of Senses, 312-13.
Difference, least noticeable, 307-8.
  perception of, 326.
Differentiation, 321.
  Sully on, 328.
Diffusion of Effects, physiological, 191, 199, 201-2, 211.
Discernment, 318-21, 352.
Discrimination and Comparison, 326.
Discriminative sensibility, of touch, 287-9.
  of muscular sensations, 339-40, 342.
  see *Psycho-physics*.
Dispositions, psychological, 45-7, 53, 129, 448, 467 (see *Habit*, *Interest*).
  Stout on, 46.
  physiological, 48.
  emotional, 217.
Distraction, feeling-tone of, 269.
Double-Aspect Theory, 94-5, 97.
Double-Contact, 333, 449.
Dualism, 97.
Duration of Sensation, 282.
  see the various Senses.
  Measurement of, 311.
  Estimate of, 386.

Ear, structure of, 291-2.
Effort and self-consciousness, 111-12.
  in trivial acts, 116-17.
  effect on learning, 161.
  see *Voluntary*.
Elaboration, mental, 71-2, 318ff., 327-8.
  Sully on, 328.
Emotion, abolishes inner conflict, 117.
  instinctive, 154-5, 231.
  qualities of, 210-12.

  v. Hartmann on, 210.
  Külpe on, 210.
  not merely organic feelings, 212, 222ff.
  structure of, 212-15, 227.
  problems, 216.
  and Sentiment, 216.
  Baldwin on, 217.
  Höffding on, 218.
  and Habit, 218ff.
  persistence and survival of, 219-20.
  not merely conservative, 220.
  idealising effect of, 220-1.
  and expression, 215, 221ff., 247.
  partly caused by its expression, 221.
  starts with a mental or central disturbance, 223.
  "strength" of, how tested, 218, 225, 235.
  James on, 222.
  development of, 226ff.
  Höffding on, 227.
  Bain on, 229.
  Wundt on, 230.
  order of appearance, 227.
  three types of, 231.
  revival of, 234.
  classification of, 235-6.
  memory of, 374, 378-9.
  hallucination of, 380.
  and character, 381.
Emotional mood, 225.
  disposition, 217.
End, desire for, transferred to Means, 228.
  of Conation, 258, 260.
  ultimate, 264.
End-state, 258, 260.
Energy, material, 76, 92-3.
  Helmholtz on, 76.
Ether, 295-6.
Evanescence, alleged, of mental states, 15.
Evolution, 23-4, 226.
  of Senses, 312-13.
Experience, 50.
  as test of Mental Life, 51.
  learning from, 51-3, 159, 320.
  mental processes implied in, 53.
  see *Learning*.
Experiment, 30.
Experimental Psychology, 30-2.
Explanation of Facts, 8.
Expression, see *Emotion*.
Extension, Externality, see *Space*.
External Reality, perception of, 330-2.
  objects, identity of, 334-5.
  objects and sensations, 335-6.
Eye, structure of, 296-301.
Eye-movements and Attention, 178.
  see *Accommodation*, *Convergence*.

Familiarity, feeling of, 322-3, 382, 432.
  influenced by Organic Sensations, 195.
Fatigue and Rest, 191.
  effect on Learning, 161, 373.
Fear, Darwin on, 213.
  bodily symptoms, 213-14.
  object of, 214.
  psychical side of, 214.
  as animal impulse, 237-8.
  as Expectation, 238.
Feeling, Knowing, Willing, interdependent, 55-7, 71, 259 (see *Tripartite*).
Feeling, 54, 65, 68.
  relation to Activity or Conation, 55-7, 259, 352-3.
  distinguished from Feelings, 66-7, 211.
  psychologically subjective, 66.
  and pleasure-pain, 67.
  Ward on, 67.
  Sidgwick on, 68.
  James on, 69.
  neutral, Bain on, 207.
  Höffding on, 207-8.
  transference of, 228.
  and Desire, 263.
  Bain on, 263.
  æsthetic, 271.
  Bain on, 271.
  conditions of, 272-5.
  Gurney on, 274.
  see *Feeling, theories of*, and *Feeling-tone*.
Feelings, organic, 186ff., 281.
  distinguished from External Sensations, 186-7.
  correspond to internal changes, 188.
  Mercier on, 188.
  Jastrow on, 188.
  varieties of, 189ff.
  vital, 189-90, 449, 462, 464.
  connected with vital feeling, 190.
  muscular, 190-2.

  of condition of nerves, 192.
  of respiration, 193.
  of alimentary canal, 193.
  of internal temperature, 194.
  why called Organic Feelings, 195.
  difficulty of investigating, 195.
  no distinct presentational element, 196-7.
  Sully on, 196.
  Horwics on, 196.
  why called Sensations, 197.
  variations in, 198-9.
  massive or voluminous, 199.
  Ward on, 199.
  mode of Revival, 200.
Feeling, theories of, 257ff.
  psychological theory, 260-1.
  biological (evolutionary) theory, 276-7.
  Spencer on, 276-7.
  physiological theory, 277.
  psycho-physical theory, 278.
Feeling-prompted activity, 259, 322-3.
Feeling-tone of special sensations, 201ff.
  physiological factors, 202.
  qualified by organic and muscular feelings, 202-4.
  dependent on quality of sensation, 204.
  on intensity, 205.
  on duration, 206.
  of intellectual activity, 266ff.
Field of consciousness, 41.
  of vision, 299.
"Finer" emotions, 217, 224.
  Ribot on, 224.
Fishes, sense-perceptions of, 319.
Forgetting, possibility of total, 358.
  process of, 365.
Fovea centralis, retina, 298-9.
Free ideas, 72, 396 (see *Memory*, *Imagination*).
Freedom of Will, 86-7, 121.
  consciousness of, 121, 299.
Friendship, sentiment of, 217, 245.

General Ideas, 423, 426-8, 433-4.
General Mind, 27.
  Lewes on, 28.
  and Language, 28.
General Truths or Laws of Mind, 4.
Generic Image, 431, 433.
Genetic Psychology, 23, 25.

Habit, Law of neural, 357, 372.
Habit, force of, 122.
  revival of, 122.
  physiological basis of, 123.
  works independently of Attention, 124.
  as foundation of Growth, 124, 126, 168.
  as conservative, 125.
  meaning of, 125.
  characteristic feeling of, 126.
  and instinct, 126.
  and emotion, 218ff.
  neural, 372.
  see *Disposition*.
Hallucination, 379-80, 409, 410-11, 413, 414, 422.
  and Perception, 414-16.
Handwriting, learning, 161.
Harmony, æsthetic, 273ff., 294.
Hate, emotion of, 241.
Hearing, 282, 290ff.
  organ of, 291-2.
  sense of, 293ff.
  qualities of sound-sensation, 293.
  pitch, 293.
  musical sounds, 293.
  noises, 293, 295.
  timbre, 293.
  range of notes audible, 294.
  harmonics, 294.
  harmony, 294.
Hope, emotion of, 239.
Hunger, internal feeling, 190.

Ideal Self as constant motor idea, 110.
  not fixed, 111, 447.
Ideal Sentiments, 232.
"Ideas," Locke on, 6, 313.
Ideas, free, 72 (see *Memory*, *Imagination*).
  only of Percepts, 72.
  active tendencies of, see *Ideo-motor*.
  attention to, 180.
Identical points, retinal, 300.
Identity, see *Personal*.
Ideo-motor action, examples of, 101.
  not Voluntary, 102, 107, 168-9.
  range of, 102.
  ambiguity of the term, 103.
  Stout and Baldwin on, 103.
  James on, 103.
  compared with Voluntary Action, 104.
  and Interest, 130.

Illusions, 411-12, 414.
Image, place of, in mental life, 61, 436.
  see *Imagination*, *Memory*.
  retinal, 299, 300, 350, 354, 420.
  double, 331, 335-6.
  complementary, 367-8, 405, 407.
Images, motor, and Volition, 61 (see *Motor*).
  visual, attention to, 178.
  auditory, attention to, 179.
  on "field of darkness," 405-9.
  generic, 431, 433.
Imagination, 72.
  reproductive, see *Memory*.
  and Memory, 392-3.
  constructive, 394, 422.
  forms of, 395.
  receptive, 396.
  and experience, 396, 417 (see *Sympathy*).
  creative, 396-7.
  types of, 397.
  illustrations of visual, 397-9.
  conceptual, 399, 401-3.
  visual, and practice, 400.
  verbal, 400-1.
  imageless, 400-1, 432, 436 (see *Conception*).
  physiological basis, 412-16.
  Bain's view of, 412.
  limitations and dangers of, 416-19.
  rational construction in, 419-21, 422.
  and conception, 423.
Imitation, 101, 168-9, 433, 451, 452-3, 468.
  and Sympathy, 247-8.
Impulse, 140.
Inattention, 131.
Indifference, feeling, 207-8.
  and Habit, 218-19.
Individual Psychology, 21.
Inhibition, 115, 464.
"Inner Sense," 12.
Innervation, sense of, 64, 147, 149, 180-1.
  muscular, and Conation, 176ff.
Instincts as Typical Reactions, 150-1.
  complexity of, 151-2.
  James on, 151, 157.
  Schneider on, 151.
  modifiable, 152.
  simple, 152-3.
  may be dormant at first, 152-3.
  as spontaneous tendencies, 154.
  complex, 154.
  cognitive aspect of, 155.
  transitory, 155-6.
  foundations of habits, 156-7.
  indeterminate, 156-7.
  biological, 157.
  and reflex action, 157.
Instinctive emotions, 154-5, 231.
Intellection, 54, 69, 72.
Integration and Comparison, 326.
Intensity of sensations, 282 (see under the various Senses).
  of Activity, 174, 180, 184.
Interaction, of Mind and Body, 96-8.
  Ward and James on, 96.
Interest and Knowledge, 70.
  as progressive, 126.
  and Attention, 126-7.
  and Self, 127-8, 447.
  feeling-tone of, 127-8.
  as permanent mental tendency, 128-9.
  sensitive to stimulation, 129, 164.
  spontaneity, 129.
  as psychological disposition, 129.
  as affecting Ideo-motor action, 130.
  pervades mental life, 131.
  and Instinct, 162-3.
  immediate and derived, 163.
  and Constructive Activity, 164.
  as Ideational Preparation, 165.
  and Imagination, 165.
  and Time-perception, 362-3.
Internal feelings, see *Feelings, organic*.
Introspection, 10ff., 20 (see *Observation*).
  examples of, 3, 4.
  scientific, 4, 11.
  alleged difficulties of, 13-16.
  difficulties overcome by practice, 15, 17.
  division of Attention in, 16.
  dependent on work of predecessors, 17.
  Comte, Mill, and Lewes on, 18.
  supposed to be impossible, 18.
  and Retrospection, 19.
  in Experimental Psychology, 31.
  limitations of, 38, 40, 195.

Involuntary action, 104, 115, 118-20.

Judgment, 437-8.

Kinæsthetic sensations, 147, 149, 181.
Knowing, Feeling, Willing, interdependent, 55-7, 71, 258-9 (see *Tripartite*).
Knowing, 69-71.
  and Interest, 70.
  objects of, 69-70.
Knowledge, search for, as mental activity, 180, 265ff.
  "for its own sake," 63, 265.
  valuation of, 265.
  sense-basis of, 315.
  see *Conception*.

Language and the General Mind, 28.
  and Thought, 81.
  and Conception, 426, 431-8.
  and Imitation, 452-3.
  and Judgment, 437-8.
Law of Relativity, 37ff.
  of Transference (feeling), 228.
Laws of Nature, 75, 77.
  of Mental Process, 7, 8.
  of Association, 366ff.
Learning by Experience, 51-3, 159, 320, 322, 424-5.
  implies Recognition, 322-4.
Learning, process of, 158.
  waste of energy in, 158.
  through random trials, 159, 424-5.
  through selective Attention and Comparison, 160, 424-5.
  illustrations, 161.
Level, reflex, 113.
  sensori-motor, 114.
Levels, nerve-cells of different, 113-15.
  Hughlings Jackson on, 113.
  of Development, physiological, 118.
  psychological, 71.
Localisation of Brain-function, 78, 389.
  of Sensations, 288 (see *Space*).
  in past Time, 383, 393.
Love, emotion of, 242-3.
  and Sympathy, how related, 243.
  animal, 243.
  exclusiveness of, 244.
  as Attachment, 244.
  Martineau on, 245.
  as "romantic," 245.
  as Friendship, 245.

Malevolent emotion, 242.
Margin of consciousness, 40, 101.
Matter, 75.
  as phenomenon, 86.
Meaning as felt, 323.
  as recognised, 324.
  of words, 426-9.
Mechanical theory of Nature, 76, 83.
  of Brain, 77-83.
  limitations of, 91-3.
  of Consciousness, 84.
  untenable, 85-7.
  aspects of mental life, 89, 90, 317.
Memory and Introspection, 18, 19.
Memory of pleasure and pain, 232-3.
Memory, factors in, 356.
  desultory, 357.
  as functional, 359.
  individual differences in, 360.
  auditory, 360, 364, 374, 399, 410.
  visual, 360, 364, 374, 379, 384.
  improvements in, 360.
  experimental work on, 363.
  method of Ebbinghaus, 363, 365.
  references to experimental work, 364.
  primary image, 368.
  effect of Emotion and Interest on, 370-2.
  and Fatigue, 373.
  motor or muscular, 374, 384, 399.
  emotional, 374, 391, 412-13.
  Bain's theory of, 378, 412.
  James on Bain's theory, 378.
  Ribot on Bain's theory, 378, 412-13.
  of taste and smell, 374, 399.
  tenacity of muscular, 375.
  verbal, 376.
  touch, 376.
  image and percept, 376-7.
  direction of Attention in, 377, 379.
  Ribot's theory of, 378.
  emotional and intellectual, 379.
  localisation in, 383.

- rational Construction in, 384, 419-21.
- errors, 384-5, 442.
- and Desire, 385.
- and Expectation, 386.
- and Interest, 386.
- estimate of Duration, 386, 390.
- practical deductions, 387.
- diseases of, 387-9.
- and Imagination, 392-3.
- physiological Basis, 412-16.
- and the Self, 441, 462-3.

Mental Pathology, 23.
Mental Process and Object, 2.
- different from Brain-process, 10.
- fugitive character of, 15.

Mind, 5 (see *Consciousness*).
- "states" of, 6.
- Laws of, 8.
- and Brain, 9, 10, 73ff.
- Höffding on, 97.
- the General, 27.
- as Feeling-Subject, 260.
- as productive, 230, 468-9.

Minimum sensibile, 307.
Mood, organic, 189.
- emotional, 225.

Moral Sentiment, 251ff.
Motor Adaptation and Perception, 330-2, 354.
- images or ideas, 61, 146, 181, 400, 447.
- and sensory images, 177.
- sensations, 146-7, 281-2, 331.
- discrimination of range by, 339-40, 342.

Motive, strongest, meaning of, 109, 173.
Motives, identity of, 109.
- comparison of, 110, 171.
- connection with the Self, 109-10.
- apparent and real, 110.
- ambiguity of term, 111.

Movement, 29 (see *Action*, *Instinct*, *Reflex*).
Muscular sensations, see *Motor*, *Kinæsthetic*.
- feelings, 190-2.

Nausea, internal feeling, 193-4.
Needs, bodily, 140.
- and feeling, 277.
- mental, 140 (see *Desire*).
- "organic," Ribot on, 278.

Nerve-pains, 192.
Neutral feeling, 206-8.
Nominalism, 426-31 (see *Conceptualism*).
Non-voluntary action, 104, 116.

Object and Mental Process, 2, 79.
- of Knowledge, 69.
- kinds of, 70.
- see *Perception*.

Observation of Mental Facts, 7-9.
- physical and mental, compared 9, 11, 12.
- limitations of, 9, 12.
- aided by interpretation of others, 13, 20, 246.
- indirect or inferential, 20, 21.
- errors in, 27.

Obstinacy, 174.
Organic sensations, see *Feeling*.

Pain, see *Feeling*.
Pain-sensations, 197-8.
Parallelism, 94-5, 97, 98.
- Stout on, 96.

Passive touch, 333.
Perception, as Learning from Experience, 52, 159, 330.
- as mere Discernment, 318-21, 352.
- as Recognition, 322-4.
- essentials of, 324, 352.
- and Memory-images, 325, 391.
- and Memory-images, contrast of, 376-7.
- and Subconscious Inference, 326.
- and Comparison, 326.
- of External World, 329, 377.
- of physical Reality, 330.
- and Motor Adaptation, 330, 354.
- of the Bodily Organism, 332-4.
- of permanent objects, 334-5.
- of animate and inanimate objects, 336-7.
- of Time, 352-3.
- and Imagination, physiological basis, 414-16.
- of Space, see *Space*.
- and Conception, 423.

Personal Identity, 383, 440-43.
- and Memory, 441-2.

Personality, alterations of, 35-6, 388, 457-62, 463.
Personifying tendency, 336-7.
Physiological dispositions, 47-8, 357, 372.
- illustrations in Psychology, 32.
- Münsterberg on, 32.
- theory of Feeling, 276-8.

Physiology and Psychology, 30-2.

"Pineal Gland," 77 and Glossary.
Pleasure, see *Feeling*.
Pleasure-pain, differences in quality, 210.
  memory of, 232-3.
  Höffding on, 233.
  revival of, 234.
  general conditions of, 257ff.
  psychological theory of, 250ff., 278.
Present, the, 352-3, 366, 385-6.
Presentations, 54, 69, 70.
"Primarily Automatic," 134.
Primary Qualities, 329-30.
Productive power of Mind, 230, 468-9.
Psychological dispositions, 45.
  see *Habit*, *Interest*, *Sentiment*, *Disposition*.
Psychology, attitude of, 1-3, 5.
  provisional Definition of, 5.
  branches of, 20ff.
  and Logic, 439.
Psycho-physics, 30, 306-11.
  methods of, 309.

Qualities, primary and secondary, 329-30.
  of sense-feelings, 310.
  of special sensation, 282.
  see the various Senses.
Qualities, real, and Sensations, 336-7.

Reaction to sense-stimulus, 182.
Reaction-time, 135-6, 311.
  individual variations, 135-6.
  Wundt on, 135.
  Baldwin on, 136.
Real qualities, how related to Sensations, 336-7.
Reality, physical, 330-2, 336-7.
  Stout on, 331-2, 336-7.
  Sully on, 332.
Recognition, 322-4, 381.
  and Meaning, 324.
Redintegration, Law of, 369.
Reflection, technical term, 10, 11.
Reflex arc, 113, and Glossary.
  action, 113, 115, 143.
Reflexes, conditioned, 143.
  unconditioned, 144-5.
  Pawlow on, 143ff., 148.
Relativity, Law of, 37, 53.
  Hobbes on, 37.
  Stout on, 39.
  Bain on, 39, 40.
Repetition, experiments on, 362.
Reproduction, 35, 357ff., 366 (see *Retentiveness*).
Resemblance, 229, 326.
  "simple," 328.
  and Comparison, 326.
Respiration, internal feelings of, 193.
Rest, in learning, 162.
  muscular, 195.
Retention, 357ff. (see *Retentiveness*).
Retentiveness, 46, 53, 317ff.
  and Discernment, 320.
  and Recognition, 322-4.
  and Association, 324-5.
  physical substratum of, 359.
  conditions of, 360, 363.
  and fatigue, 360, 370.
  and Attention, 361.
  and reproduction, 361.
  and repetition, 362.
Retina, 297-9, 413.
Retinal field, direct control of, 405-9, 413.
Retinal Image, inverted, 420.
Reverence, and Sympathy, 250, 255.
  and Moral Worth, 252.
Revival, spontaneous, 129.
  of Habits, 122.
  of Emotions, 234.
Rods and Cones, retinal, 297-9.
Routine action, 193, 197.

"Secondarily Automatic," 123-4, 161.
Secondary qualities, 325-30.
Selection, mental, see *Attention*, *Interest*.
Self and Feeling, 66.
  and Motives, 110.
  and Interest, 127-8, 447.
  moulded by Desires, 170.
  and Body, 333-4, 449.
  and Memory, 441, 462-3.
  meaning of Term, 443-9, 469.
  and Activity, 443-5, 454.
  social, 446-7.
  ideal, 447.
  idea of, 446, 447.
  development of, 449-57.
  continuity of, 465-7.
Self-consciousness, 10-11, 446-7 (see *Self*).
  and Volition, 108.
  and Effort, 111, 118.

Self-projection, 337.
Selves, conflict of, 175.
Sensations, 29, 70, 72, 280ff.
  organic or internal, see *Feeling*.
  special or external, 186-7, 201, 280ff.
  quality, duration, intensity, 282.
  complexity of, Sully on, 314.
  extensity of, 343.
  measurement of, 306-11.
  and Discernment, 318-24, 327.
  and Real Qualities, 335-6.
  of Pain, 197-8.
  special, feeling-tone of, 201-5.
  special, diffusion of effects, 201-4.
  voluntarily induced, 409-10.
Sense, "inner" and "outer," 12.
Sense-memories, 360.
Sense-objects in Education, 164.
Senses, development of, 312-13.
Sense-training and Attention, 167, 321.
Sensibility, 306-11.
  range of, 307.
  of Touch, 287-9.
  of Muscular Sensation, 339-40, 342.
Sensori-motor action, 103, 114, 169.
  arc, 114, 169.
Sentiment, emotional, 216.
  simple and complex, 217.
  ideal, 218.
  moral, 251ff.
Sight, 282, 295ff.
  stimulus, 295-6.
  organ, 296-301.
  retina, 297-9.
  retinal image, 299-300.
  binocular, 300-1.
  sensation, qualities of, 302-5.
  intensity, 304.
  saturation, 304.
  duration, 305-6.
Similarity, law of, 368.
Smell, sense of, 282-5.
  associative power of, 373.
  M'Kendrick on, 285.
Social factor, 27, 252, 446.
Sound, see *Hearing*.
Space, perception of, 337ff.
  and motion, 337.
  and coexistence, 338, 341.
  as perceived and as conceived, 338.
  theories of, 338.
  Bain and Mill on, 339-41.
  and Extensity, 343ff.
  James on, 343.
  and Local Signs, 344ff.
  by Touch, 345-6.
  of the Blind, 345-6.
  by Sight, 347-50.
  two-dimensional, 347-8.
  three-dimensional, 348-9.
  and eye-movements, 349-50.
  by Sight and Touch, 351.
  of memory-images, 377, 407.
Spontaneity of Interest, 129, 391.
Spontaneous action, 104.
  attention, 134-5.
  revival, 129, 372, 391.
Stereoscope, 300-1.
Strength of Will, 174.
"Strongest" Motive, 109, 173.
Subconscious processes, 37, 41.
  illustrations of, 42-4.
Suffocation, internal feeling, 193.
Surprise, emotion, 236, 268.
Suspicion, mania of, 373.
Sympathy, 229, 231, 243, 245ff., 255.
  Bain and Sully on, 246.
  Imagination and Imitation, 247-8.
  contagion of Feeling, 248-9.
  higher forms, 248, 250.
  as benevolent impulse, 250.
  and Conscience, 255.
  in Art, 271-2.

Taste, sense of, 282-4.
  Wundt on, 283.
  qualities of, 283.
  and smell, 284.
  M'Kendrick on, 284.
Temperature, internal feeling, 194.
  external sensation, 289.
Tendency, 61, 183-4, 270.
  Stout and Baldwin on, 62.
"Tender Emotion," 243.
Thirst, internal feeling, 190.
Thought, 72, 423ff.
Threshold of Consciousness, 43-4, 307-8.
Time, perception of, 352-3.
  idea of, 352, 366, 385-6.
Tongue, organ, 283.
Touch, sense of, 281, 286-9.
  Sully on, 286.
  qualities of, 287.
  sensibility of, 288-9.
  active and passive, 333.
  double, 333.

Trace, 123, 146, 168-9, 320, 328.
  see *Disposition*, *Retentiveness*.
"Tripartite," or three-fold division of Mind, 54-9.
  Tetens and Kant on, 54.
  Ward on, 58.
  Hamilton on, 59, 259.
  Stout on, 59, 262.
  limits of, 57, 59.
Truth, 265.

Ultimate factors of mind, 59.
Unconscious processes, 44ff.
  Stout on, 46.
  Lipps on, 48.
  James on, 49.
  see *Disposition*.

Vision, field of, 299 (see *Sight*).
Vital feeling, relation of other organic feelings to, 190.
Volition, early forms of, 169.
  complex, 170.
  and Memory, 169-70.
  and conflict of Desires, 171.
  implies dominant purpose, 171.
  forms psychical dispositions, 171.
  depends on emotional development, 171.
Volitional action, 104.
  attention, 132-3.
Voluntary action, 60, 104.
  as Choice, 104-5.
  choice of End, 106-7.
  decision affects series of actions, 107, 141, 170.
  contrasted with routine, 107.
  decision and self-consciousness, 108, 170.
Voluntary effort, 111.
  and self-consciousness, 111-12, 118.
  conditions of, 112.
  implies inner conflict, 112.

Weber's Law, 310-11.
Will, 60 (see *Voluntary*).
  strength of, 174.
Willing, Knowing, Feeling, as interdependent, 55-7, 71, 259.
  see *Tripartite*.
Wonder, 266, 268.

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